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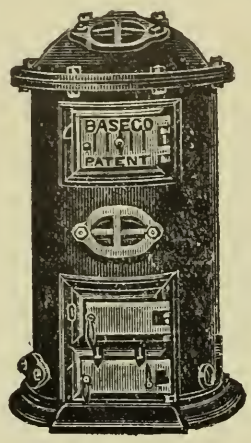

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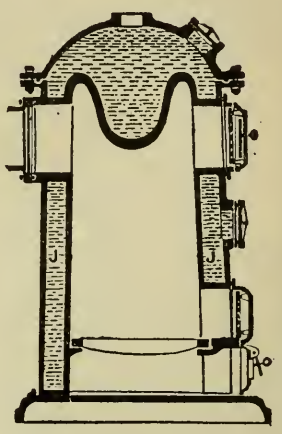

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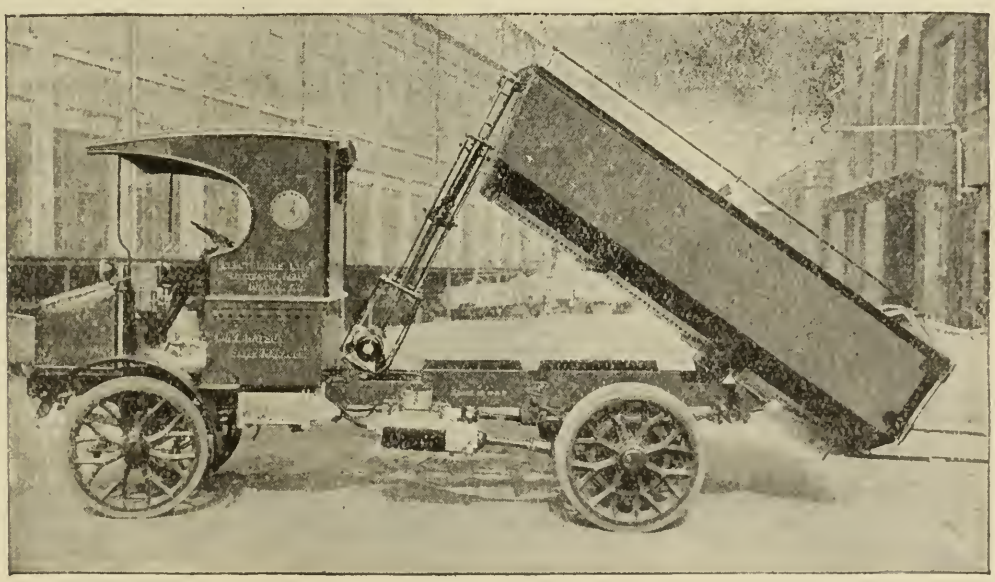

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JOURNAL

OF

THE ROYAL SANITARY INSTITUTE

CONGRESS AT FOLKESTONE.

CONFERENCE I.—REPRESENTATIVES OF SANITARY AUTHORITIES.

Presidential Address, by the Right Worshipful the Mayor of Folkestone, ALDERMAN R. G. WOOD, J.P.

ALTHOUGH the greater part of Folkestone is modern, it is a town of great antiquity. It was incorporated by Edward II, and if you look at the list of Mayors in the Council Chamber you will there see the name of the Mayor for the year 1358, and each subsequent year.

In the old part of the town we have narrow streets and courts, but in the new part you find open squares, wide avenues, trees planted in almost every thoroughfare, and the Leas, which we have been told by those who have travelled, is almost, if not quite, unique.

Previous to 1844, the town was described as "a collection of houses which its maligners called a fishing town and its well wishers a watering place," and in that year the South Eastern Railway was opened with the result that a gradual and steady growth set in until we have what we think is the attractive town as you see it to-day. There is a pure and abundant water supply, the air is mild yet bracing, a light soil giving us freedom from ground fog, damp and mist, and we get a full measure of breeze and sunshine; nature's best disinfectants.

In recent years we have carried out many Sanitary improvements. In place of the former refuse tips outside the town, a Horsfall Destructor has been installed by which all the town refuse is cremated, having the effect of reducing infantile diarrhœa and other intestinal diseases.

We utilise the by-products from the Destructor for making clinker bricks, paving stones, channels and curbs, fence posts, tiles, window sills, lintels and sink supports, gable blocks, chimney hoods and steps, and many

other articles. Fish offal is dried and converted into a valuable fertiliser for which there is a ready sale at a good price, and oil is extracted from fish livers.

In addition to the sea as a bathing place and the swimming and other baths belonging to the Bathing Establishment Company, the Corporation have provided a number of slipper baths under the provisions of the Baths and Washhouses Acts, and these are well patronised.

The Corporation, and I may add the Lord of the Manor of Folkestone (the President of this Congress) are not unmindful of the necessity of open spaces, and within the last few years his Lordship has handed over to the town the beautiful Leas, besides having laid out the gardens and promenade between the Pleasure Pier and Sandgate. Further, Lord Radnor has within the last 12 months come to an arrangement to hand over to the Corporation the whole of the Cliff east of the Harbour and what is known as the Warren (a beautiful spot at the foot of the cliffs towards Dover). There is also Radnor Park of 21 acres, near the Central Station, and a small piece of land (in a thickly populated district) just conveyed by Lord Radnor, which will shortly be laid out as a playground.

With regard to the Housing Question, which all Sanitary Authorities have with them just now, we have been fortunate in Folkestone by the action of our Borough Member, Sir Phillip Sassoon, who, when the question was acute, formed a Public Utility Society, which has erected above 24 houses and 8 flats which are now completed and occupied. The Corporation are laying out about 20 acres and erecting 200 houses of various types in the northern part of the town, and about 70 of these are now finished and in occupation. Though I have seen many schemes in different parts of the country, I have not seen such a delightful position or houses so artistic in design or the ground so well planned as at Folkestone. Our Health Committee have entirely departed from the austere type of straight parallel roads and adopted a newer method of crescents, squares, etc., playgrounds are provided for infants in close proximity to the houses and there will be a common recreation ground for all.

May I now suggest one or two matters which, in my opinion, should receive the careful consideration of this Conference, as necessary for our future reconstruction. First, you will all agree, is the codification of all the Laws relating to Public Health. We have had recently the formation of the Ministry of Health to bring under one head the central administration of all health matters, and I suggest as a natural sequence that all the enactments and orders relating to Public Health should also be brought under one head. Again, many cities and boroughs have in private Acts obtained various beneficent clauses which at present are denied to other parts of the

country. For instance, why should Manchester, which has powers to inspect Dairy Herds and Cowsheds outside its area, be more favoured than other parts of the country in view of the advantages which have accrued by the reduction of tubercular infected milk supplies, one of the chief causes, as I am informed, of Tuberculosis.

Again, we in Folkestone recently obtained a local Act, which amongst other powers, provides that under certain circumstances an owner must bear the cost of keeping his own drains in a sanitary condition, whilst under similar circumstances in other towns this expense must be borne by the local Authority. If these powers are beneficial to the inhabitants of Folkestone, they should be equally applied to the whole country in one consolidated Public Health Act.

Another matter of importance is the better conservation of our Public Water Supplies. We see on the one hand districts with an abundance of water, and in others, a shortage. I suggest this matter should receive the close attention of a Congress like this in order to suggest a better collection, storage and conservation of our water supplies.

The enormous waste of fuel supply, which affects the Public Health, also requires attention. The incomplete combustion of coal, giving off palls of black smoke, still gives scope to the inventor's genius, and the waste of heat in various forms is not a credit in this necessarily economic age.

The grouping of several small districts is a question which, in my opinion, should be urged upon the Government with a view to economy and great efficiency, where properly qualified officers could be employed to devote their whole time to their work.

I have very briefly referred to what appear to me one or two matters which require the consideration of Members of Sanitary Authorities, and no doubt this and other sections of the Congress will deal more fully with the subjects I have mentioned. To increase the health is to increase the wealth, the prosperity and the happiness of our fellows, and although much remains to be done we may expect that constant and strenuous effort on the part of the representatives of the people may be crowned with that success which we all desire, and I hope that the Folkestone Congress of 1921 will materially assist in this direction.

Legislative Reform Needed in the Interest of Child Life.

By A. Wellesley Harris, M.R.C.S., D.P.H., Medical Officer of Health, Lewisham (Fellow).

ON examination of the Registrar General's last Annual Statistical Report, 1919, for England and Wales, we find in that year 692,438 children, potential men and women, were born. Comparing this figure with that for 1914 a reduction of 186,658 is made evident. This falling off in the number of births in itself is of sufficient importance to induce us to strain every effort and explore every channel by which we may be the better prepared not only to conserve the lives of those born, but to remove conditions which, although not fatal, may have disastrous effect in after life upon the mental and physical condition of the helpless infant. Fortunately Public Health Authorities have for years recognised their responsibilities, and magnificent work has been successfully accomplished in child welfare all over the country. The results have been proved not only by statistics, showing a steady annual decline in infant mortality, but the improved physical condition is most evident in the babies and young children of to-day.

There is a section, however, not so fortunate. I refer to the unwanted child and the illegitimate child. The former is often unfortunate in its birth. It may be born to a mother devoid of maternal love or whose occupation prevents her having a permanent home. Such children are often boarded out in infancy and later in life deposited in some cheap boarding school. Then we have the illegitimate child, and here there is little improvement in the chances of life. Quoting from the report referred to above, we find of the total births registered in 1919, 41,876 were illegitimate, a considerable increase over the figure for 1914. It is fair to consider this army as unwanted little ones, many of whom will not have a mother's care and protection. It is also permissible to add a large number who, although born in wedlock, are, for reasons above stated, similarly placed. Let me refer to the infant mortality returns for 1919.

Deaths (England and Wales) per 1,000 Births.

Legitimate ...	39 under 4 weeks.	80 under 1 year.
Illegitimate ...	66 ,,	136 ,,

The fact of legitimacy or illegitimacy is not wholly responsible for this appalling difference. All of you must have frequently read reports of cases brought before the Courts of inhuman cruelty by parents, but more often

by persons who have, for gain, accepted the care of children, or have accepted sums of money for complete surrender. If you had before you the reports of the National Society for the Prevention of Cruelty to Children you would be saddened. Whenever we try to improve the existing conditions we are met with difficulties. You must get the law amended. This is a difficult thing for an individual. I suggest to you, however, the following points for your consideration and discussion in the hope that this conference may make useful and practical representations through the Council of the Institute to the Ministry of Health.

1. That the provisions of the Children's Act (Part I.), 1908, which deals principally with registration, inspection and control of Foster Homes, where children under seven years of age are received for gain and maintained apart from their parents, should be amended in order to transfer the duties from the Poor Law Guardians to the Public Health Authorities throughout England and Wales, and in London to the Metropolitan Borough Councils. it would make for efficiency and prevent overlapping.

2. Legislation is required to protect infants from total surrender for fixed sums of money without proper safeguards. This should be done through the Public Health Authorities, and the infants protected by inspection. I would even go farther and give facilities for the option of a Public Trustee for an infant separated from its parents. The Public Health Authority, through an officer, could act in this capacity. We have a Public Trustee existing for money; why not for human life in special cases?

3. Registration and inspection of Boarding Schools run by private ownership for gain. In recent years there have been many exposures showing cruelty and neglect. Why should these children, by such neglect, suffer permanent injury?

4. Registration and inspection by Public Health Authorities of Private Day Schools. Many of these are ordinary dwelling houses, totally unsuited for the purpose, overcrowded, ill-ventilated and badly lighted; conditions which are a menace to the health of the growing child.

Inadequacy of Poor Law and other Relief. Its effect on Public Health.

By T. W. Naylor Barlow, O.B.E., M.R.C.S., L.R.C.P., D.P.H., Barrister-at-Law, Medical Officer of Health, Wallasey (Fellow).

MY object in reading this paper is to direct attention to a glaring instance of mistaken economy. We have for years, without a murmur, been paying millions a year for the support of hospitals (Poor Law and General) in out-door relief, out of work doles, etc. I suggest that by spending thousands on children, and concentrating on children, a good many millions spent later on would be saved. Concurrently with this I would urge that further powers for dealing with parents who neglect their parental duties should be obtained, but I would point out at the same time that our ideas of punishment need urgent revision. For example, parents are summoned for neglecting their children ; they are taken before the magistrates, and, when found guilty, they are either fined or sent to gaol. In reality both punishments have the same effect, the penalty is really paid by the family. If a man goes to gaol he does not work for a time. Who suffers ? His children. The man is fed and comfortably housed in prison ; but there is no money to buy food and clothing for his children. In the same way a fine merely decreases the food fund, with consequent loss to his children. A man or woman when punished should be made to work and be paid for that work so that the children may be fed out of the proceeds of that work.

But, while we are accompishing these desirable reforms, it is our obvious duty to look after the children. Now the Poor Law is the legal authority for relieving distress. Let us see how this task is accomplished.

A man is out of work and applies for relief. In nine cases out of ten he is offered the Workhouse. What does this mean ? It means that he loses his house ; no small thing in these days. He also loses his furniture. What happens to him when he comes out of the Workhouse ? The man has to find work and at the same time find a home and furniture for his family. The Poor Law Authority won't allow the man out first to look for work ; the family must all go out together. Supposing, however, they are granted relief. What is the amount of relief granted ? Now the Poor Law Authority of my district is by no means one of the worst, in fact I think it can be described as one of the best Boards of Guardians, taking a reasonably modern view of its duties, so that the general position is really worse than the recital of the following cases which have come recently under my notice, would suggest.

(1) A woman with two young infants, aged six months and two years, deserted by her husband, has been granted 26s. per week by the Guardians. Out of that she pays 5s. a week rent.

(2) Another deserted mother with two children, living with her father, himself earning hardly enough for his own needs, is given 20s. per week.

(3) Another, widow mother, five children, eldest 10, youngest 15 months. She has 11s. pension. The Guardians allow her 35s. per week and she pays 5s. 6d. per week rent.

(4) Another woman, 5 children, eldest 8 years, and a baby; parish relief 35s. per week.

With the prices of food and clothing as they are at the moment, it is absolutely impossible on these allowances for these women to feed and clothe themselves and their children adequately, *i.e.*, to allow of their being kept in good health, with the results which I have sketched out in the opening of this paper.

The Government, in their wisdom, have granted a total disablement benefit to soldiers maimed in the War. I do not suppose that anyone will accuse the Government of excessive liberality, and I do not, in regard to pensions granted to disabled soldiers, for one moment imagine that they intended the amount granted to be anything more than would provide clothing and food just sufficient to keep the family in health. Their estimate of that cost is £2 for a man, 10s. for his wife, 7s. 6d. for the first child, and 6s. for every succeeding child. Contrast that with the amounts granted by Boards of Guardians.

To give another instance of the manner in which relief is granted, or rather not granted. A widow with six children, eldest child 15 years and earning 7s. per week. Other children, ages 13, 11, 9, 7 years, and 3 months, the last being illegitimate. The Guardians used to allow this woman 30s. per week. Since the illegitimate child came the 30s. was stopped. The mother is allowed 10s. a week by its father. This woman was a decent hard-working woman, certainly not vicious, and really more to be pitied than blamed for this lapse. She had to stay at home to mind the baby aged three months, and the whole family has had to live on the 10s., plus what the eldest child was earning, 17s. in all. When she applied for relief she was offered the workhouse. As I have just pointed out, if she goes to the workhouse her home will go. She cannot stay in the workhouse for ever, and, moreover, it will cost the public funds more to keep her family there than the amount of out-relief which should be necessary for this family. Why the Guardians should constitute themselves a court of morals and discontinue the relief because a woman has an illegitimate child is beyond my comprehension.

But I submit, it is bad business, to put it no higher, to let these young children be half-fed and insufficiently clothed, and if it were possible to follow up their lives, it would almost certainly be shown that some will

probably die in infancy, and that others will cost the ratepayer or taxpayer very considerably more during their lives than the amount which need be spent to preserve their health at the critical portion of their lives.

Again, in dealing with illegitimate children, it is the deliberate policy of Poor Law Authorities, if the mother is unable to earn enough money to support the child, never to grant her any relief in respect of the child. She can go into the workhouse with the child, or the child can go into the workhouse hospital if it is sick, but immediately it is better it is thrown on to the care of the mother again. This means, in fact, that the Authority for the relief of destitution offers as a means of relief something which 99 per cent. of mothers of illegitimate children will not accept. The Guardians may boast that they have saved so much money and are keeping down the rates, while Medical Officers of Health will deplore the fact, and have been deploring the fact for ages, that the illegitimate death rate is never less than twice the ordinary infantile mortality rate of the district. What seems to be the view commonly held, that a child's life is of no value is an utterly mistaken one. No one can prophesy the career of any child, legitimate or illegitimate, poor or rich. The potentialities of any child are enormous. We daily lavish energy, money and time, in hospitals and other places, on attempting to save the lives of adults which, as their past careers in many instances show, are not worth saving.

It is time that the public was educated to a proper perspective in this matter, and that when a decision that relief is necessary has been come to, after a proper inquiry, that relief should at least be adequate to maintain the recipients in good health. If the amount of relief falls short of what is necessary to accomplish this, the money is to a large extent wasted.

The above remarks particularly refer to relief granted to widows and to women with families deserted by the husbands, but, who, owing to the ages of the children, cannot assist themselves in earning money to help in providing for them. The foregoing persons are likely to require relief for some considerable time, and such relief should be adequate to provide the families with proper food and clothing. My experience has been, and the cases previously recorded show conclusively, that the amount granted is not sufficient in the district from which I come, and it is even less adequate in a very large number of other districts.

The following took part in the discussion on the papers by Dr. A. Wellesley Harris and Dr. T. W. Naylor Barlow (pages 196 and 198) :—Countess C. De Lormet (Camberwell) ; Dr. E. Francis (Barnsley) ; Mr. W. T. Jackson (Manchester) ; Dr. D. A. Belilios (Wimbledon) ; Dr. Joseph Cates (Surrey) ; Ald. R. Montford (Islington) ; Counc. W. J. Primett (Luton) ; Dr. G. Clark Trotter (Deptford) ; Mr. H. Morrison (Blaydon-on-Tyne) ; Dr. C. S. Thomson (Hyde) ; Miss F. O'Riordan (Camberwell).

A Review of the Costs and Results of the Various Public Health Activities.

By W. Allen Daley, M.D., B.S., B.A., B.Sc., D.P.H., Medical Officer of Health, Blackburn (Member).

I HAVE been led to prepare this paper because the time has now come when, as a result of the urgent need for private and public economy, a careful review must take place of the value received for every form of municipal or State expenditure. With regard to expenditure on efforts to preserve the health of the people, it is agreed generally that it would be false economy to restrict expenditure on any sure and certain method of improving the public health. Expenditure on roads or parks, for example, might be postponed and taken up in two or three years without any permanent harm to the community, but in considering the question of postponing expenditure on saving life, we must remember that the dead do not rise, and that for want of their care those dependent on them often become a burden instead of an asset to the community. A grave responsibility, therefore, rests both upon those who advocate the expenditure of large sums of public money on schemes, the value of which is open to question, and upon those who advocate the postponement of schemes the utility of which has been proved. The great need of the moment, therefore, is to decide which public health work is of proved value, which has its value unproven and which, if any, may be regarded as comparatively ineffective. It is one of the difficulties of our work that its triumphs are invisible, and only its failures patent. The story of the averted epidemic is lost in the pages of an annual report, but the raging pestilence is known to all.

The primary objects of a health service are to reduce sickness and postpone death. Statistics with regard to sickness are very scanty, even now, ten years since the passing of the first National Insurance Act, save with regard to the notifiable acute infectious diseases, and these are of little relative value so far as adult workers are concerned. There is no evidence that the amount of sickness amongst insured persons has been appreciably reduced since the Act of 1911 came into operation.

With regard to the acute infectious diseases, though some show evidence of being controlled, the statistics for others form melancholy reading. Plague, cholera, typhus fever and small pox have almost disappeared from the country: typhoid fever has been very much reduced; the deaths from scarlet fever are very small, but the number of cases shows little change; the number of cases of diphtheria shows a tendency to increase;

measles and whooping cough (now more formidable than any of the infectious diseases yet mentioned) show no sign of lessening their toll of lives.

In connection with the campaign against the acute infectious diseases (to combat which the Public Health Service was formed) four periods may be discerned :—

1. The campaign against filth and insanitation which resulted in the provision of a pure water supply, sewerage, scavenging, building bye-laws, etc., and which caused the disappearance of typhus fever.

2. The period of the compulsory Vaccination Acts, which ultimately caused the disappearance of smallpox, save when imported from abroad.

3. The period when isolation hospitals were erected throughout the country with the expectation that the diseases treated therein, particularly scarlet fever and diphtheria would disappear. Their failure as preventive agents is due to the presence of " carriers " of disease, who spread infection without being ill themselves, and to the fact that in many infections the patient has infected others before his disease has been diagnosed.

4. The fourth stage, which we are now entering, is one where it is recognised that the source and fountain of most infectious diseases is man himself, and that in the education of the individual on the subject of his health lies the best hope of controlling the spread of these diseases ; further education on health will lead to a knowledge of how to live so as to prevent disease and of the first signs of serious illness so that a doctor may be consulted early.

With regard to the postponement of death, the second great object of the Public Health Service, the last Life Table issued by the Registrar-General, based on the experience of the years 1911-12, shows that the expectation of life at birth for males has been increased from 40 to 51 years since the issue of the first Life Table, which was based on the experience of the years 1838-54. For females the increase has been from 42 to 55 years. Further, the reduction in the average death-rate of 30 to 40 years ago compared with the average death-rate of the last ten years, shows throughout England and Wales a saving each year of no less than 187,000 lives.

The many factors involved in this reduction give ample scope for disagreement as to which are the principal ones. We are mostly concerned to-day in considering what effect, if any, the Public Health Service has had in this reduction. We may divide public health work into two main classes : in the first lies what may be called " sanitary engineering work," for example, water supply, etc., and the other services, which came into being as a result of the campaign against filth and insanitation. Their effect on the reduction of the death-rate, even if measured solely by the prevention of loss of life from typhus and typhoid fevers, must be consider-

able. They are essential services, and they must be continued; the possibility of economy in both scavenging and sewage disposal by the adoption of newer methods is being fully considered by those concerned.

The second class of public health work is that about the relative value of which there is room for controversy. It is the work actually performed in the Medical Officer of Health's department and under his immediate supervision. It includes work directed primarily against infectious diseases, for example, the provision of pathological laboratories, hospitals and ambulance and disinfection services; anti-tuberculosis work (including dispensary, hospital and sanatorium); maternity and child welfare work; work directed against venereal diseases; the School Medical Service; Food Control; the control of nuisances, workshops, repair of insanitary houses, etc. An attempt was made to ascertain the national expenditure on this and all other health work. It was unsuccessful and I, therefore, asked my colleagues, the Medical Officers of Health of County Boroughs to send me particulars of the expenditure of their departments during 1919-20, the last financial year for which full particulars are available. I am most indebted to them for having so kindly acceded to my request. Figures have been prepared showing the gross cost of the services per head of the population and per £ of rateable value. The actual payments by the ratepayers of the towns concerned being, however, somewhat less than those indicated owing to the Government paying 50 per cent. of the cost of anti-tuberculosis, maternity and child welfare and school medical service work, and 75 per cent. of the cost of measures taken against venereal diseases. The figures show variations in the cost of health work from 2s. 3d. to 9s. 4d. per head of population and from 3¾d. to 2s. 6d. per £ of rateable value. An analysis of the expenditure shows that for every £100 expended on health work:—

£26 is spent on work against infectious diseases, mostly hospital maintenance.
30 on anti-tuberculosis work.
13 on maternity and child welfare.
5 venereal diseases.
9 School Medical Service.
2 Food Control (though this figure does not include the cost of the Abattoir in cases where this is controlled by a Markets' Committee).
15 administration and work on general sanitation.

An attempt was made to discover whether there is any difference in the vital statistics of places where much and where little is spent on health work, but for many reasons it was felt that no satisfactory result could be obtained

without a very elaborate analysis of present and past expenditure and statistics.

The principal matter for discussion is whether the present allocation of money spent by Health Departments is the best possible, or whether better results could not be obtained by other methods. In this connection it is necessary to note how popular opinion influences public health expenditure, for example, the distribution of disinfectants is demanded by the public and sometimes acceded to by a Health Committee, but except in a few cases, such as the disinfection of sputum or excreta, their sole result is to replace one unpleasant smell by another. Political expediency influences expenditure: the phrase "first-class hotels" has caused an incalculable amount of discontent in Sanatoria and has led to the erection of expensive structures as Sanatoria, when often lighter and cheaper ones would have done just as well. Again, moral considerations have to be included, for example, the *cheapest* way to control venereal diseases would be the distribution of packets, but the moral objections are so great that this is not likely to be an agreed policy.

In many schemes great results are produced at the beginning, when there is much scope for improvement, but further advance takes place only with great difficulty: a moderate expenditure produces in ships and trains a certain speed, but for every mile an hour beyond this the extra cost is very much higher. This is probably the case in maternity and child welfare work; a small expenditure on Health Visitors and Schools for Mothers undoubtedly produces splendid results, but when a little more is desired and hospitals are built the expenditure rises by leaps and bounds. On the other hand, in infectious diseases success, by reducing the number of cases, leads to still further success with less instead of greater expenditure.

It is difficult to get away from tradition and to realise that we must judge all our work by the effect it will have on the health of the individual. The following list of relative values may be offered as a basis for discussion: I include only those duties commonly carried out in a Medical Officer of Health's department, and exclude, therefore, such eminently Public Health measures as Registration of Births and Deaths, Vaccination, Hospital Treatment of the Sick Poor, Water Supply, Scavenging, Sewage Disposal etc.:

RELATIVE VALUES OF PUBLIC HEALTH WORK.

Infectious Disease Services.

	Hospital.	*Home Supervision including Supervision of Contacts.*	*Total.*
Scarlet Fever	5	5	10
Diphtheria	20	10	30

Typhoid Fever	5	3	8
Measles	15	25	40
Whooping Cough	15	25	40
Other infectious diseases, including Smallpox	35	27	62
	95	95	190
Disinfection			5
Bacteriological Laboratory			25
			220
Tuberculosis.			
Tuberculosis Dispensary, including home visiting of cases and work of Tuberculosis Officer		25	
Pulmonary Hospital		15	
Non-Pulmonary Hospital		15	
Sanatoria—Adults		10	
Children		20	
			85
Maternity and Child Welfare.			
Home Visiting		50	
Schools for Mothers		100	
Infants' Hospitals (as at present run)		30	
Maternity Hospitals and Ante-natal work		50	
Supervision of Midwives		20	
			250
Venereal Diseases			80
School Medical Service.			
No value if inspection only ; the value given includes treatment and open-air schools			200
Food Control (excluding Milk).			
Adulteration			1
Wholesomeness and Sanitation			9
Milk.			
Adulteration			5
Wholesomeness, including action against dirty and tuberculous milk			35
Repair of Unfit Houses			10
Removal of Nuisances			5
Propaganda on Health, including preparation and publication of vital statistics and Annual Report			100
			1,000

The values given in each case represent, in the opinion of the writer, the results as shown by their effect on the prevention of sickness or postponement of death of the efforts of well-organised Public Health Departments of our

great towns. It is assumed that all gross conditions of insanitation, for example, privy middens, have been dealt with. New methods and new discoveries may materially alter these values, for example, if a reliable cure for pulmonary tuberculosis were discovered, the relative value of anti-tuberculosis work would have to be very much increased; if a cure for advanced cancer were available, a place would have to be found for it in our scheme; if all the Public Health work of the town were done by the Health Department an entire redistribution would be necessary to provide for vaccination, general hospital treatment, etc., while certain work, for example, administration of Sale of Food and Drugs Acts, Rats and Mice Destruction Acts, issue of certificates under Increase of Rent Act, may have little or no effect on health, and therefore receive a very small value in our table, yet it must be admitted that they can be most effectively administered in a Health Department.

It will be noted how largely these suggested values differ from the values set by the general public upon our work, most of whom regard the removal of nuisances, including ashpit refuse, and the detection of food sophistication, as the chief work of a Medical Officer of Health. If one compares the actual expenditure of Public Health Departments against these suggested values, it will be noted that we are apparently spending too much on work against acute infectious diseases, too much on anti-tuberculosis work, and not enough on maternity and child welfare, on venereal diseases and school medical work. When the very heavy cost of maintaining the scarlet fever wards is considered it does appear desirable to revise our present methods by which hospital treatment is afforded whenever this is desired by the patient's friends. With regard to the expenditure against tuberculosis, our present methods appear to be inadequate, but newer methods will no doubt be evolved.

I must acknowledge my indebtedness to many Medical Officers of Health for the supply of information and to my colleagues Dr. Ewing and Mr. Fowler for helpful work with the figures.

REFERENCES.

New York State Health News, December, 1920.

Charles V. Chapin, M.D.
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Sir George Newman.
The Lady Priestley Memorial Lecture.

The following took part in the discussion on this paper Dr. C. S. Thomson (Hyde); Dr. A. Trimble (Belfast); Dr. S. G. Moore (Huddersfield); Dr. J. Middleton Martin (Gloucestershire).

Administration of Maternity and Child Welfare Work.

By Councillor J. C. W. JULYAN, Mayor of Poole, and Chairman, Health Committee.

NO sphere of Municipal work has been more adversely criticised than the one with which I have undertaken to deal. Since the passing of the Maternity and Child Welfare Act about two years ago, progressive Authorities throughout the country have taken up the work, with considerable success where it has been properly administered.

It is, I think, quite unnecessary to go into detail as to the various schemes that have been put into operation, my object being rather to try and draw out the opinions of those who are dealing with the problem, in order that some clear idea may be obtained for future guidance ; particularly in view of the recent order of the Ministry of Health requiring the submission of schemes for their approval, with estimates of the amount considered to be necessary for providing milk for expectant and nursing mothers and delicate children up to 5 years of age.

From information obtained from different parts of the country, it appears that the income per head in a house has in most cases been the basis on which free or assisted milk has been provided : some instances are given at the end of the paper for reference and information.

That schemes have been abused and too free a distribution made in some cases is admitted, but on the whole I claim that lasting good has been done, and if the work is developed on right lines in the future a great deal of the physical inefficiency which has been such a blot on our national life in the past will be prevented, by reason of the fact that both mother and child have been provided with needful nourishment and attention to enable the child to make a good start.

The period during which the work has developed has been a difficult one, and during the past year unemployment has been rife, thereby causing the number of applications to be increased, and the expenditure in a corresponding degree, and this is the cause of the amount that was anticipated to be required having been so largely exceeded.

Many Authorities are providing Maternity Hospitals, or subsidising beds in General Hospitals for treatment of selected cases.

I am confident that in proportion as this work is developed and every child given a good start before and at birth, the need for School Clinics and Treatment Centres will decline, and likewise the present costly provision of Institutions for the cure of physical inefficients. My own opinion is that every case should be investigated, and a signed application made

shewing the total family income from all sources, but if the case is considered urgent by the Medical Officer of Health or one of his Health Visitors, an order should be given pending the investigation. The co-operation of voluntary agencies in this direction is desirable. The whole of the work should be under the control of the Medical Officer of Health, who should be the responsible officer to advise the financial officers, who in future have to approve the issue.

Summarised the position seems to be this :—

Has the work been beneficial, and is it fulfilling a useful purpose in the furtherance of Preventive Medicine ?

Is the new Order on right lines, or will it hinder the administrative officers in their work ?

Towns in South of England.

	Population.	*Income Limits.*
Poole ...	43,400 ...	Free up to 7s. per head exclusive of rent.
No. 1 ...	62,332 ...	,, 7s. ,, ,, ,,
No. 2 ...	235,000 ...	,, 5s. ,, ,, ,,
No. 3 ...	53,580 ...	,, 7s. 6d. ,, ,, ,,

Towns in North of England.

No. 1 ...	105,000 ...	Free up to 10s. per head exclusive of rent.
No. 2 ...	41,128 ...	,, 7s. 6d. ,, ,, ,,
No. 3 ...	106,337 ...	Variable scale.

The following took part in the discussion on this paper :—Dr. W. I. J. Whitley (Northumberland) ; Sir S. Penfold (Folkestone) ; Dr. J. J. Buchan (Bradford) ; Counc. Mrs. Drapper (Deptford).

The Hygienic Value of the Village Institutes of Denmark.

By Miss C. Smith-Rossie (Associate).

(Synopsis.)

Denmark, by her system of Village Institutes for enlivening the intelligence, has made her rural communities much healthier, happier, temperate and prosperous than otherwise would have been the case.

The Village Clubs Association as described by Sir Henry Rew, K.C.B., in the May number of *The Nineteenth Century*, is following somewhat the Danish system. There are 300 affiliated branches in 45 counties, and very favourable reports of the work done have been given by the Committee over which Lord Selborne presided, the Agricultural Policy Sub-Committee of the Reconstruction Committee organised by the Government in 1916.

As far as possible village clubs should be worked by the whole rural community and not by patrons.

CONGRESS AT FOLKESTONE.

CONFERENCE II.—MEDICAL OFFICERS OF HEALTH.

Presidential Address on "Reminiscences of Public Health."

By J. Wright Mason, M.B.E., M.B., C.M., D.P.H., M.R.C.S.E., &c., Medical Officer of Health for the City and Port of Hull (Fellow).

NEVER have matters pertaining to Public Health and its administration excited so much attention as they do to-day. It seems, therefore, that my observations as your President may appropriately have regard to reminiscences of public health, confined, say, more particularly to the last forty years, the period during which I have held the position of a medical officer of health, and have reference to a few of the many of my own experiences during that time.

Whilst the Public Health Act of 1848 has properly been described as the nation's first health charter, the Public Health Act, 1875, in which was effected the consolidation of sanitary laws recommended by the Royal Commissioners, has rightly been declared to be the greatest sanitary code ever enacted. The latter Act in conception and working led for 20 years to enactments on the prevention of river pollution, the protection of water supplies, the provision of housing accommodation and isolation hospitals, and the notification and prevention of infectious disease. To quote from Sir George Newman in his "Outline of the Practice of Preventive Medicine," the Elementary Education Act of 1870, and the Public Health Act of 1875, were forms of germinative legislation bearing fruit in a single generation. Before 1875, sanitation was interpreted in large measure as negative policy, in a word, the removal of nuisances. Fully alive to the fact that the medical officer of health of to-day must take a much wider and more comprehensive view of his duties than he did in the latter part of the 19th century, and give his attention to the medical side of hygiene in maternity and child welfare centres, the medical inspection of school children, tuberculosis, and venereal clinics, etc., I am not in accord with those who think he should have no further concern with water-supplies, drainage, housing, the removal of nuisances, and like questions which have for three-quarters of a century been dealt with by him. First and foremost, he is a preventive officer, and should consequently have an intimate knowledge of any question which is bound up with the prevention of disease.

Scarlet Fever.—At the very inception of my municipal career in 1881, when, of course, the Public Health Act, 1875, was in its infancy, I was confronted with a scarlet fever epidemic that accounted for 696 deaths,

equal to a rate of 4·5 per thousand. Had the rate for this disease in Hull been the same in 1920 as in 1881, instead of there being only 6 deaths recorded in the former year, the number would have reached the alarming total of 1,311. Whilst the disease is almost, if not quite as prevalent as in former years, there has been a remarkable decrease in the number of deaths. But though the disease is of a much milder type than formerly, the probability that it may at any time assume its old malignancy makes it incumbent on local authorities to provide the necessary hospital accommodation for isolation purposes. In consequence of the war, although plans for a new infectious diseases hospital at Hull had been approved by the Local Government Board, the matter had to be held in abeyance, and it was only possible to remove to hospital 31 per cent. of the 1,371 scarlet fever cases notified in Hull in 1919. After allowing for unrecognised mild cases which receive no medical attention and the "carriers" who present no symptoms of illness, in spite of what may be said to the contrary, my experience is that, in connection with scarlet fever, as with diphtheria and small pox, it cannot be too strongly emphasised that the speedy isolation of first-known cases is of paramount importance in preventing the disease from assuming epidemic proportions.

Diarrhœa.—It may be of interest to recall another Hull epidemic, namely, one of diarrhœa in March, 1885, as it was caused through the Hull water-supply having been polluted by the excreta of persons suffering from diarrhœa at a period just anterior to the outbreak, and by contaminated water from an agricultural drain, and sewage from a farm. Atmospheric conditions could not be said to be in any way responsible for the outbreak, the weather being fine and clear. The disease was limited to houses supplied with Hull water or to persons who had business occupations in Hull and had partaken of the Hull supply. A striking feature in confirmation of the Hull supply having been contaminated was that the only persons who suffered from diarrhœa in the adjoining urban district of Newington were those who had partaken of the Hull supply, Newington's population of over 8,000 persons, chiefly comprised of artisans and people with business in Hull, being then provided with a separate water-supply by a private Company. Some 18,000 to 20,000 persons, mostly adults, in all classes of society, were attacked. It may here be noted that for many years past, Hull has had an abundant and pure supply of water constantly available under pressure, which, needless to say, has been properly safeguarded from the danger of contamination.

From returns furnished from time to time it has been shown that infantile diarrhœa in Hull, as elsewhere, has mostly been at privy houses. In one year, when voluntary notification of the disease was adopted in Hull, the

first case only in a house being notified (the object being to treat the matter as a notification of premises rather than as a notification of individual cases) out of 1,923 notifications received, 1,747 had regard to privy houses and 176 to houses provided with the water-carriage system. The percentage of diarrhœa deaths at privy houses in Hull has varied from 82·4 to 93·2. In typhoid outbreaks it has also been found that by far the greater proportion of cases has occurred at privy houses. Available figures with regard to diphtheria also prove that more cases are notified from privy than from water-closet houses; for of 700 cases notified in 1905, 83·1 per cent. were at privy houses and 16·9 at water-closet houses. Since 1903, only water-closets have been provided to new buildings in Hull; and Sections 39 to 42 of the Public Health Acts Amendment Act, 1907, having been adopted, the conversion to the water-carriage system of the privies and privy pails is now being put into effect. At the beginning of the third decade (1900-1910) of the last 40 years, the Hull Corporation took over the collection and disposal of dry dust, and since the first year of the decennium following (1911-1920), the collection and disposal of night soil have been carried out by the Authority direct; and whereas under the contract system that previously obtained the dry dust bins, privies, etc., were improperly and irregularly cleansed, the work under the new order of things has been carried out in a more efficient manner and complaints are, generally speaking, a thing of the past. As climatic conditions play so important a part in connection with diarrhœa and infantile mortality, a regular improvement, as shown by figures, is not to be expected. It is significant, however, that during the time the night soil and dry dust work have been in the hands of the Corporation there has been a reduction in the diarrhœa and infantile mortality rates. The average annual diarrhœa death rate per thousand for the two decades between 1900-1920 was 1·20 and 0·83 respectively, as compared with 1·39 in the immediately preceding decennium; and the average infantile mortality rate per thousand births for the two periods first-mentioned was, respectively, 148 and 120, as against an average of 179 for the previous 10 years.

Cholera.—In 1892, there were 8 cases of cholera in Hull, two of which were sea-borne. Anticipating that the disease might seek the same way of ingress the following year, the Hull and Goole Port Sanitary Authority took active steps to maintain its first line of defence, and by hospital ship, abundant inspection, and strict sanitary measures in relation to ships and dock surroundings, hoped to prevent a recurrence the following year. In 1893, however, there were 17 cases of cholera notified, 12 being removed to hospital. The deaths totalled 12, including 7 in hospital. Of choleraic diarrhœa 137 notifications were received, whilst the number of cases of

diarrhœa notified was 396, the deaths from the former disease being 4, and from the latter 112. Ever on the alert, the authority put into operation the facilities afforded by a thoroughly practical organisation, and thereby dealt with the cases in the promptest possible manner, and it was a matter for extreme satisfaction to the Sanitary Committee and the Town Council of that time that the Local Government Board did not consider it necessary to enforce epidemic regulations for their instruction and guidance.

Small Pox.—Apart from the influenza epidemic of 1918-19, when there were 1,292 deaths recorded in Hull, the most serious outbreak to come within my purview was one of small pox in 1899-1900, when 943 cases were notified, of which 904 were admitted to hospitals, including 406 that had to be accommodated in hastily-erected buildings on a suitable site of 23 acres in open country about 4½ miles from the City. Of the remaining 39, 10 died at home, being too dangerously ill to be removed, and 29, owing to various circumstances, some being sufficiently isolated, and others of doubtful nature, were treated at home. Of the 904 hospital cases, 748 were vaccinated and 156 showed no evidence of vaccination from marks. Of the former number, 77 died, giving a case fatality of 10·2 per cent. Of the unvaccinated cases, 76 proved fatal, equal to a case fatality of 48·7 per cent. The total deaths numbered 153, or a percentage case fatality of 16·9. Only 20 vaccinated children under 10 years were attacked with small pox, and of this number not a single case proved fatal; whilst 60 children showing no evidence of vaccination were attacked and 27 succumbed to the disease, representing a fatality rate of 45 per cent. The origin of the outbreak was possibly due to imported cases which had developed after arrival in port, and being of a mild character, and medical advice not having been sought, remained unrecognised; whilst later, the old hospital appears to have been the means of diffusing the disease. The great emigrant traffic (then about 70,000 to 80,000 per annum, comprised of Scandinavians, Finns and Poles) through the City and Port of Hull may, in spite of the vigilance of the Authority, have contributed a source of infection; for, among the emigrants, persons had frequently been recognised as having recently had small pox, and possibly the means of their disinfection had not been altogether efficient. The influence of the hospital in the dissemination of the disease was experienced by those in the vicinity. Situated as it was amongst timber yards and adjoining a road leading to a dock, some 43 cases were directly traceable to aerial infection from the hospital, including men engaged in the timber yards, slaughtermen at the cattle depôt, and others in the employ of the North Eastern Railway Company. The stamping out of the disease was, of course, very largely due to re-vaccination. In view of the old hospital having

proved to be a source of aerial infection, it was, after thorough disinfection, demolished and destroyed by fire.

Disinfecting Station.—Better facilities being required for the disinfection of bedding and articles of clothing, a disinfecting station, one of the first to be erected in the country and replete with every modern appliance was, built in 1899, on a site of 3,000 sq. yds. Isolated and easy of access, the station is provided with waiting rooms, bath rooms, etc., to which families and those who have been engaged in nursing the sick may be removed for bathing, and for the disinfection of their clothing, and accommodated in shelters attached to the building. Had the station been available in the earlier stages of the small pox epidemic, it would undoubtedly have greatly tended to minimise the infection and the spread of the disease. In connection with port sanitary administration, the station affords great advantages, as, on a vessel arriving in port with infectious disease on board, in addition to the removal of the infected person to hospital, the ship's crew and effects may be taken to the disinfecting station while the ship is undergoing fumigation. Adjacent to the disinfecting station are the quarters of the superintendent and the ambulance attendants, and also accommodation for the ambulances and other motor vehicles.

Plague.—Following close on the heels of the small pox epidemic, the introduction of plague into the port of Hull in 1901 caused considerable alarm and anxiety. The *S.S. Friary*, with a crew of 21 hands, arrived from Alexandria on the 10th January, all well on board and with clean bills of health. One of the crew had died during the voyage and the real cause of death being unsuspected, the body was duly interred on arrival of the vessel. Nine others, including a medical attendant who had been called in to attend the members of the crew who had become unwell whilst the vessel was in dock, and a watchman who was on the vessel for one night only, subsequently developed the disease, 8 of the cases terminating fatally. The bodies of the deceased were cremated at the Hull City Crematorium, excepting the one dead on the vessel's arrival and that of the last patient who died in hospital; the former, owing to the cause of death being unsuspected, and the latter, in consequence of religious scruples. Cremation is the most scientific method of disposing of the dead, and the Hull Corporation are to be congratulated on being the pioneer municipality in making this necessary provision in the interests of public health. The prompt measures in coping with the occurrence immediately it was realised that the disease was plague were successful in keeping this treacherous disease within narrow limits, thereby resulting in the country escaping what might well have proved a disastrous outbreak. In considering this case, it must be borne in mind that the incident happened 20 years ago, and since that

time our knowledge of the disease and its behaviour on board ship has been much extended. It has been demonstrated that the infection of plague is conveyed by suctorial insects, and that it is conveyed from rats to man by fleas, though the flea may not be the only means by which the disease is communicated. There were two other cases of plague in Hull in 1916. On information received from a medical attendant of the sudden death of a youth aged 17 years, I visited the home of the latter and had the body removed to the City Hospital Mortuary, where I performed a post-mortem examination and formed the opinion that the cause of death was bubonic plague. The body was afterwards cremated. Bacteriological examination of specimens forwarded to the Local Government Board subsequently confirmed my diagnosis. Whilst at the home of the deceased, I ascertained that another youth, aged 16 years, living in the same street was suffering from suspicious illness, and on visiting him, I concluded that he was suffering from bubonic plague and had him removed to hospital, and my opinion confirmed by bacteriological examination. The two youths had both worked as chippers and scrapers on board the *S.S. Keneh*, which had come from Alexandria and was undergoing extensive repairs in a dock at Hull. On the vessel's arrival in Hull all on board were well, and there had been no sickness during the voyage. The disease, of which there was no further outbreak, was, in my opinion, due to infection from rats.

Diphtheria.—There has, at different times, been a marked prevalence of diphtheria in Hull, in one year no less than 1,253 notifications being received, the number of deaths being 135, or 10·7 per cent. of the cases notified. The aggregation of children in schools has rendered the disease more prevalent in urban than in rural districts, and outbreaks have been attributable to children attending school when suffering from mild or unrecognised attacks, and in other cases to children who, though apparently healthy and consequently remaining at school, have had diphtheria bacilli in their throats or nasal organs, thereby infecting healthy and susceptible children. In Hull, it has for some years been the practice for the school medical officers to "swab" the throats of children in school classes from which a number of scholars are absent through suffering from diphtheria, and to keep every positive case from school and not allow the child to return until a medical certificate is produced that a swabbing taken from its throat is "negative," and that the house at which the child lives has been disinfected at least nine days before the day of return.

Hospital Accommodation.—For a population of 155,000, the Hull Sanitary Authority in 1881 had a hospital of 21 beds for the isolation of cases of infectious disease. Under the pressure of the scarlet fever epidemic in 1881, the number of beds was increased to 46. In 1888 the present City Hospital

was erected, in which the beds now number 160 (including extensions), followed during the small pox epidemic already mentioned by the erection of the Evan Fraser small pox hospital of 150 beds. Having in view the ever-increasing population of Hull and the proposed extension of the City, a site of 101½ acres, situate about six miles from Hull, was purchased in 1911, and on 71½ acres is to be erected a new infectious diseases hospital with accommodation for 374 beds. In 1916, a tuberculosis sanatorium of 132 beds (including 12 shelters) was erected on about 30 acres of the above site.

Tuberculosis.—In connection with the prevention and treatment of tuberculosis in Hull, two dispensaries were opened in 1913, and the sanatorium just referred to in 1916. Although not a municipal institution, but supported by voluntary contributions, a most important branch of the work is that carried on by the After-Care Committee, at a farm colony at Walkington. Here arrested cases are trained in gardening, in poultry and pig-keeping, and in boot repairing. Besides training in healthy work, the After-Care Committee assists patients who have been treated for the disease to find suitable situations, and gives grants for extra nourishment to sustain them until full working capacity returns.

Venereal Disease.—The prevention and treatment of venereal disease is a proposition in administration and in the education of the public and of the patient. The facilities for treatment are provided by the authorities of the Hull Royal Infirmary. Six clinics (5 for males and 1 for females) are held each week. The total attendances for the year 1920 were 18,261. A very unsatisfactory feature is that so large a number of patients should cease attendance before the completion of treatment. The fact that Hull is a port and is frequented by seamen of all nationalities is one good reason for this state of affairs. With regard to the remainder, there must be a very large number of cases in which there is every probability that the infection has not ceased, although doubtless some of those who cease attendance might have had a sufficient treatment. The thorny question of prophylaxis is of such a controversial nature that I propose to omit further reference to it.

Maternity and Child Welfare.—The first step in the systematic organisation of maternity is an adequate midwifery service. Eighty per cent. of the confinements occurring in Hull are attended by midwives, hence the necessity for the qualified midwife under proper supervision. Even before the event of child-birth much is done at the Schools for Mothers in the direction of satisfactory and sufficient nutrition of the mother, and at the Maternity Centres in the securing of ante-natal hygiene, proper instruction and so forth. There is also the hygiene of child-birth and the

post-natal period which involve the provision of the following services, each of which forms an important unit of a complete scheme : infant welfare centres ; an efficient staff of Health Visitors to undertake domiciliary visitation ; aid for confinement at home (*i.e.*, the services of a midwife free in necessitous cases) ; a maternity home and hospital accommodation ; a central depôt for the issue of dried milk and medicinal foods ; the provision of a home nursing service for cases of certain infectious diseases ; suitable accommodation in infant homes and hospitals ; and crèches or day nurseries. The Hull scheme for maternity and child welfare is a comprehensive one, and I have hope that, as a result of the operation of its administrative measures and a quickening which has expressed itself in wider knowledge and greater care of child life, the steady decline of the infant mortality will be maintained. A rich harvest will reward careful supervision of the child of the pre-school age period.

Unsound Food.—The Unsound Food and Foreign Meat Regulations, 1908, have imposed upon Port Authorities the duty of inspecting all foodstuffs arriving in this country ; and the powers so conferred have done much to secure uniformity of inspection and to prevent the distribution of unwholesome food.

Housing.—On so important a subject as housing, had time permitted one might have spoken at some length. Suffice it to say, that the Hull Corporation, in common with other authorities throughout the country, fully cognisant of the vital importance of this great social problem, are giving to it their constant attention. Prior to the year 1914, a considerable number of dwelling-houses in various parts of the City had been represented under Part 2 of the Housing Acts as unfit for human habitation, and no further houses have been erected on the sites cleared. Whilst the effect was the clearance of a number of dark and unhealthy courts and passages, the re-housing of the persons displaced was not provided for ; and it was found that although the powers were exceedingly good in the way of ridding the City of unhealthy houses, the tenants of the demolished premises crowded themselves into other houses which, of course, lessened the respectability of the neighbourhoods to which they went ; in other words, the slummers extended the slum districts. Further, this displacement of the population resulted in largely increasing the number of houses let in lodgings which, in my opinion, both from the moral and sanitary points of view, are very undesirable. Just before the War, the Corporation had under consideration a representation made under Part I. of the Housing Acts with regard to an unhealthy area, some 23 acres in extent, and but for the war there is no doubt that by this time such area would have been cleared and laid out on up-to-date plans for the re-housing of the displaced population. It is

estimated that over 6,000 new houses are required to meet immediate needs. Three sites of a total area of about 327½ acres have been purchased in different parts of the City, and thereon it is proposed to put 3,370 houses. A number of such houses have already been erected and others are in course of completion.

The following are some of the more important vital statistics for the City for the four decades between 1881-1920, and for the year 1920 :—

	1881-1890.	1891-1900.	1901-1910.	1911-1920.	1920.
Birth Rate	34·0	34·0	29·9	24·6	29·1
Death Rate	20·0	19·0	16·3	16·0	13·2
Zymotic Rate ...	2·88	2·78	2·36	1·57	1·04
Infantile Mortality Rate	163	179	148	120	98

Regarding the population of Hull, in 1881 it was 155,160, or a little more than half the present estimated figure of 290,808. During the inter-censal period 1901-1911, among the 14 largest towns in England and Wales, Hull's percentage of increase in population was the highest, being 15·7, the two next highest being Sheffield and Manchester, whose increase was 11·1 and 10·8, respectively.

Whilst this retrospect has been mainly concerned with my personal experiences, comparing public health matters to-day with what they were in 1881, there is nevertheless afforded some indication, broadly speaking, of what has obtained in the various towns and cities in the country ; for it has to be remembered that having exercised the powers conferred upon them by the same general enactments and by similar local acts and by-laws, other authorities have been enabled to bring about altered conditions that are in striking contrast with what they were 40 years ago. In spite of what has already been accomplished much indeed remains yet to be done. During the last half-century, the increase of pathological knowledge, including that of infection, has been one of the outstanding features of the age in which we live. No Public Health Department is complete without its bacteriologist. We now know that the problem of the human " carrier " of bacterial infection is one of ever-increasing importance and one which must be grappled with very seriously in the near future ; whilst it is one of the most difficult, it is at the same time one of the most urgent questions from the point of view of the hygienist, the bacteriologist, the general medical practitioner and the medical officer of health ; and the Scottish Board of Health is to be congratulated in solving the problem for its area. In a letter issued to local authorities it is explained that " carriers " are persons who, while not showing any other sign or symptom of a particular infectious disease have within themselves the germs or other infective virus of that disease,

and are liable to pass on the infection in an acute form to other persons. In regulations which have been drawn up by the Board, and which came into operation on the 1st March last, a local authority is empowered to deal with a person adjudged to be a " carrier " of an infectious disease in the same manner as if he actually suffered from the disease. Before a person is to be deemed a " carrier," however, he must be certified as such by a medical officer of health, and also by another registered medical practitioner, such certification to have effect for a period not exceeding three months. Further examinations may be made at any time after the date of the certificate, and the " carrier " may demand to be re-examined during the currency of the certificate.

The old and artificial boundary between preventive and curative medicine is rapidly disappearing, and Parliament is constantly imposing upon the medical officer of health new duties and responsibilities that require of him a wide knowledge of medicine, administrative ability of a high order, and the exercise of first-class powers of conception and initiation in the development of the health work of local authorities. Since 1912 the majority of the schemes for the treatment of school children have been instituted, and in connection with tuberculosis, maternity and child welfare, and venereal diseases.

League of Nations.—In spite of the seeming irrelevance of my so doing, I should here like to make a passing reference to the covenant of the League of Nations. Though much has been done by successful international conventions in the adoption of scientific lines of preventive action in regard to epidemic diseases which may be carried by ship, it is extremely gratifying to medical officers of health, as to all who are deeply interested in public health matters, to know that one of the undertakings of this covenant has regard to the steps to be taken in matters of international concern for the prevention and control of disease; for its adoption will eventually be the means of very far-reaching results capable of bringing untold influences for good on the health and happiness of mankind the wide world over.

In conclusion, I am firmly convinced that great as have been the remarkable results already achieved by sanitary reform, the advent of the Ministry of Health has brought us to the beginning of a new era in which, if all concerned go hopefully and resolutely forward, giving unstintingly of their best endeavours to this end, we shall come to the full realisation of those highest ideals in public health that have hitherto been regarded as unattainable.

Milk and Disease.

By S. G. Moore, M.D., Ch.B., D.P.H., Medical Officer of Health, Huddersfield (Member).

(Abstract).

IT may be said that this subject has already received so much attention that it is not worth spending time on, but there seem to be two good reasons why it should receive your attention to-day. Firstly, because notwithstanding everything that has been written and spoken on the subject, there is no material improvement in the supply; and secondly, because certain action on the part of the Municipality of New York is not as well known as its significance and its importance demand.

While it is not necessary to set forth in detail the dangers and damage caused by the present milk supply, yet it may be desirable to do so very briefly if only to secure a semblance of continuity of narrative, and also perhaps for the refreshment of memories. Two Royal Commissions have reported that milk containing tubercle bacilli is dangerous to the health of consumers. Delépine and other workers have conclusively proved by animal inoculation that from 6 to 10 per cent. of the milk supplied to the public in this country contains such disease producing germs.

It is well known that much of the summer diarrhœa which, year by year, levies so heavy a toll on infants and children results from contaminated milk. Surgeon Trask, of the United States Public Health Service, collected records of 179 epidemics of scarlet fever, diphtheria, and typhoid fever, which had been definitely traced to milk, and he was careful to observe that the list was not complete.

The origin of the pollution is not far to seek; it is well known and need not be set forth in detail. Forty-two per cent. of the herds in this country are infected with tuberculosis, while in 2 per cent. the udders are affected (see report of English Royal Commission). The conditions in the places where milch kine are housed are well known, and may be set forth in a sentence. The standard of cleanliness maintained is that of a dirty stable; but milk is a food and ought to be produced in places conforming to standards for kitchens. The ingrained inveterate habits of the average milkman are well known: cows not groomed, hands not washed, same clothing as that in which he does his other work, including the shifting of manure, and so on. Pre-eminent among the lack of things is that of an abundant supply of pure water.

Some years ago I spent an hour explaining to a farmer the need for an alteration of the gross insanitary conditions of his mistals. Later the Chief Sanitary Inspector reported that the man had said that I was "nobbut auf-witted," and from his point of view there was justification for the observation. His buildings and his standards were "normal"; if he were able to, and attempted to conform, to what we regard as reasonable, he would be quite unable to compete with his neighbours: that is a plain, simple fact.

We must therefore, look around for a substitute for pure raw milk, because it is not forthcoming at present, and will be unattainable for at least a generation. The very small amount which is now on the market is costly, and would not suffice to supply a single small town. Yet we must do all that we can to applaud and second the efforts of those who are endeavouring to obtain a supply of pure raw milk—it is undoubtedly the best—it is the ideal at which we should aim. On the other hand it would be improper to contemplate a continuance of the present system: too much sickness, too many deaths, too much suffering, too great an amount of unhappiness are caused by the present polluted supply.

In September, 1920, New York City took over the laboratories and depôts which had been established and maintained there for many years by the Honourable Nathan Straus, and is now conducting them as a municipal undertaking. For 5 years there has been a law in that city providing that only two kinds of milk may be sold for public consumption, namely, pasteurised milk, and grade I. certified milk. It is not necessary on this occasion to define these, but a word of warning may be uttered against "flash" pasteurisation. An unknown, but considerable, proportion of the present supply is passed through apparatus in a stream: it enters at room temperature, and passes out at something like 170°F. By measuring the capacity of the chamber, and the quantity passed through in a given time, one is able to say that the average period of exposure to this range of temperature is less than 10 minutes. The effect of the process is to delay the souring of milk: it does not destroy pathogenic micro-organisms. The expense of the procedure is recouped to purveyors by the avoidance of loss through souring, which would render considerable quantities of milk unmarketable. It also enables them to keep milk for longer periods, and thereby adapt their purchases to their needs more closely than would otherwise be the case. One has no fault to find with this procedure unless, or until, it is claimed to be Pasteurisation. We know that it does not conform to the definitions of Pasteurisation, and we know that its results fall short of the essentials of that process.

Similar laws to those of New York are in operation in Chicago and

Cleveland, and in 95 per cent. of the cities of the United States having populations greater than 100,000 Pasteurisation is enjoined though not enforced.

We Britishers are patient, and long-suffering: we endure ills (more especially those to which we are habituated) with a long-suffering which is almost asinine. The last Royal Commission on Tuberculosis reported 14 years ago; effective measures have not yet been taken to rid our herds of the disease and to protect ourselves from this danger. It is safe to assume that this apparent inactivity of the authorities is the direct outcome of the difficulties in the way of obtaining a supply of pure raw milk, but if the enactments which have been found practicable on the other side of the Atlantic were taken into careful consideration by the authorities, it is not too much to hope that at the end of 12 or 18 months one of the greatest advances in public sanitation would have been achieved. I therefore submit for the consideration of the Section the following resolution, which I hope will be referred to the Council of the Royal Sanitary Institute for its consideration, with a view to the resolution, if adopted, being transmitted to the Minister of Health.

For resolution see page 244.

The Milk Problem in Hot Climates.

By Colonel R. J. Blackham, C.B., C.M.G., C.I.E., D.S.O., M.D., F.R.F.P.S., M.R.C.P.E., D.P.H.Lond., of the Middle Temple and Gray's Inn, Barrister-at-law, late Hon. Surgeon to the Viceroy of India, Chevalier of the Legion of Honour, Kaisir-I-Hind Medalist for Public Service in India (Fellow).

THE adulteration of milk is almost universal in Indian bazaars and a large proportion of the milk supply is contaminated. In most cities the milk is in the hands of men ignorant of the elements of sanitation and addicted to uncleanly practices. Moreover, the milk is liable to be contaminated in transit. On the other hand the price of milk is high and the problem of improving the purity without raising the price is a difficult one."—Government of India Resolution, 1914.

The word milk in England, unless qualified, means cow's milk, but in hot climates it may mean cow's, buffalo's, goat's, or even sheep's milk. The two chief sources of milk are, however, the cow and the buffalo, and most samples in warm countries consist of a mixture of both.

Nearly a dozen years ago I published a report on "Milk in India" (*Journal of the R.A.M.C., Vol. vi., p. 187*). I examined in Government of India Military Laboratories three hundred and fifty samples and found that cow's milk was uniformly above and buffalo's uniformly below the standard laid down by various writers.

My averages were as follows :—

	Cow's.	Buffalo's.		Cow's.	Buffalo's.
Water	88·7	83·7	Fat	3·0	6·3
Total solids ...	11·3	16·3	Ash	0·7	0·7
Non-fatty solids ...	8·3	10·0			

I paid special attention to the composition of buffalo's milk and the average result of my 124 samples was as follows : Specific gravity, 1034·04 ; total solids, 15·9 ; fat, 5·9 ; non-fatty solids, 10·0. I have compared my results with those of other investigators and find the chemical composition of cow's milk in the tropics may be summarised as follows :—

1. Specific gravity	10·27 to 10·32	5. Lactose	4·03 to 4·4 %
2. Total solids ...	13·10 ,, 17·22%	6. Ash ...	0·69 ,, 0·75%
3. Fat	3·4 ,, 7·71%	7. Water ...	86·90 ,, 82·78%
4. Solids not Fat...	9·7 ,, 9·51%		

The above maxima and minima show that the chemical composition of milk, certified by veterinary inspectors as produced under decent conditions, varies very widely.

The following summary of a large number of analyses shows that the compositions of buffalo's milk may be stated as under :—

1. Specific gravity	10·27 to 10·35	5. Lactose	4·03 to 5·25%
2. Total solids ...	13·82 ,, 22·90%	6. Ash ...	0·75 ,, 0·8 %
3. Fat	5·00 ,, 11·6 %	7. Water ...	77·10 ,, 86·18%
4. Solids not Fat ...	8·82 ,, 11·30%		

The above maxima and minima show what a variable product buffalo's milk can be. The result of my investigations may be summarised as follows :—

1. Cow's milk of Indian Government dairies is above the standard laid down in Board of Agriculture's Order.
2. The analyses do not compare favourably with English dairies.
3. Buffalo's milk from Government dairies is, in its percentages of fat and total solids, much below the standards laid down by all authors, with the exception of Richmond and Peppel.
4. The results of analyses of buffalo's milk indicate that the amount of butter fat is most in warm moist climates like Bengal and least in cool dry climates like the Punjab.
5. I demonstrated that no general standard can be fixed for the tropics generally, and especially that the percentage of fats usually accepted requires re-consideration.

My published results referred to chemical analyses of milk and these are useful as they enable us to say if a sample of milk is genuine or not, but they do not reveal contamination. Milk may pass the chemical test and yet be not only dirty but infected with pathogenic organisms.

I also devoted considerable attention to bacteriological examinations, and have had an opportunity of comparing my results with those of other investigators in the tropics of recent years, notably the late Dr. L. L. Joshi of Bombay. The routine procedure adopted has been : (1) Microscopical examination of centrifugalised sediment ; (2) examination of number of microbes per cubic centimetre ; (3) test of lactose fermenters in different dilutions ; (4) examination for B. coli communis and B. enteritidis sporogenes. To those who are not familiar with the bacteriological examination of milk the following figures may be of interest :—

Sewage *micro-organisms.*

	Per C.Cm. Millions.
England	2 to 11
Boston	2 ,, 3

Milk (240 samples) *micro-organisms.*

	Per C.Cm. Millions.
England (Summer) ...	20 to 30
,, (Winter) ...	3 ,, 5
India	36

It will be seen that the bacterial contents of milk in India and England are often greater than those of sewage.

Generally speaking, no bacterial standards for milk have been fixed, but Dr. Joshi, in the light of his experience as Municipal Analyst for Bombay, suggested the following :—

(1.) Microbes per cubic centimetre. The total number of microbes should not exceed 2 millions from November till March, and 5 millions from April till October.

(2.) Lactose fermenters should be absent from one cubic centimetre.

(3.) Centrifugalised sediment. Only a few streptococci should be present and pus cells should be absent.

(4.) Pathogenic organisms. Nil.

I cannot support (1) and (2) of these standards as the first is too low and the second far too high. The standards laid down by the Ministry of Health and which are being worked on by the County laboratories in England, are as follows :—

(1.) Micro organisms per cubic centimetre, 30,000.

(2.) Organisms of the coli group, *i.e.*, lactose-fermenters, absent from 0·1 of a cubic centimetre.

Dr. C. Ponder, Assistant County Medical Officer and Bacteriologist for Kent, assures me that B. coli organisms are always to be found in one cubic centimetre of milk even from the best farms. Milk, to be even reasonably safe, should not show more than half-a-million micro-organisms per cubic centimetre at any time of the year, and no organisms of the coli group should be present in the tenth of a cubic centimetre.

There is an aspect, however, of the milk question which I particularly want to emphasise and it is this : The quality of cow's milk depends largely on the food supplied to the animals. Even cows from our fine English meadows deteriorate rapidly when transferred to the tropics where dried food consists of straw and hay rapidly ripened, dried to a cinder under a hot sun, and lacking the " sappiness " so essential for milch cows. The native cow is turned out to find its living on burnt and dried patches.

Chemical and bacteriological standards may be set down as I have tried to do above, but no laboratory report can accurately indicate the essential " goodness " of a milk sample.

Milk is like no other food but raw eggs. It is the only other product of a living animal used by man. All other animal products are taken from the animal after it has been killed. Milk, therefore, being an animal secretion varies with the breed, food, water supply, and even the temper of the animal. Milk secreted in the enervating climate of the tropics must be entirely different from that secreted in England or any white man's country. The average European or better class merchant in the tropics keeps his own cows, and I have often been consulted by an anxious mother when

the milk disagreed with her infant or when older children were not thriving. "We have our own cow; so our milk must be all right," she would say, having failed to realise the effect of the enervating climate on the animal.

The difference between the milk of Indian and imported cattle is very striking, and it is within the experience of every tropical practitioner to have seen a child who was going from bad to worse when being fed on native cow's milk, begin to thrive immediately when put on milk from an Australian cow. Even in the Argentine, which is the most favoured place for cattle breeding next to England, the farmers have to import fresh blood from England at frequent intervals. Long experience has shown that the difficulty of rearing cattle in the tropics cannot be overcome. The cost of living and of feeding products for animals is just as acute a problem in hot countries as it is at home. "The Man in the Street" has exaggerated notions of cheap living in the tropics. It is rarely known that milk is sold at the same price in Bombay as in London. Before the war it was actually dearer, and it is doubtful now if high grade milk can be obtained as cheaply in Calcutta as in Chester!!

Pure milk produced under the best conditions and kept clean until its consumption is the ideal to be aimed at everywhere, but in view of the foregoing it seems well-nigh unattainable in the tropics at present. It is little to be wondered at that physicians and sanitarians have turned from the filthy white sewage nicknamed "milk," to the attractive sterile milk powders which have recently been put on the market. My attention was specially drawn to these products when in charge of a District Military laboratory, and during 1910 I carried out a series of analyses and experiments on behalf of the Government of India. My report strongly advocated the adoption of dried milk for military purposes, and I formed so favourable an opinion of the product that I have ever since steadfastly advocated its adoption as a substitute for cow's milk for infant feeding (*Blackham's Care of Children, 4th Edition, pp. 13 to 18*). The product is especially adapted for tropical use, and I strongly support the view of Dr. Harston, of Hong Kong, who has emphasised the advantages of dried milk over condensed milk in warm countries.

In a paper read before the Birmingham Congress of this Institute last year, I pointed out that, apart from employment as a substitute for fresh milk in the hand rearing of infants there is a wide field of usefulness for milk powder as a food for healthy adults and invalids.

I need here refer only to five conditions, and that very briefly:—

(1.) *Sprue and Chronic Dysentery.*—I have seen this form of milk extremely well tolerated in cases in which ordinary cow's milk entirely

disagreed, and have prescribed it with considerable success among the pensioners attending a Tropical Disease Clinic of the Ministry of Pensions.

(2.) *Tuberculosis.*—This disease is the real plague of the Tropics. The digestion is often feeble in tropical cases, and I have found that milk powder is more readily digested and more readily taken than fresh milk by both Indians and Europeans.

(3.) *Tropical Diarrhœas.*—Milk powders are specially useful in these conditions for two reasons, (1) their fine clot, and (2) the fact that they can be digested in strong concentration. The chief objections to ordinary milk, its bulkiness and its hard curd, are thus surmounted.

(4.) *Lactation.*—Every tropical mother should nurse her own child, but owing to loss of appetite it is exceedingly difficult to get women in hot countries to drink fresh milk. They nearly all complain that it gives them indigestion and constipation. Dried milk, as a rule, does neither, and is consequently of the utmost value, as it enables the mother to continue nursing by supplying her with readily absorbed nourishment.

(5.) *Typhoid Fever.*—During the discussion on my paper at our Congress last year, the Medical Officer of Health of St. Helens spoke very highly of milk powder diet in typhoid fever, and the product is now very extensively used in the dietary of this disease in India and every part of the tropics.

On the Mediterranean littoral and very many places in and near the tropics where cow's milk is unobtainable and goat's milk dangerous, dried milk has a very large range of application, and for long voyages, exploring parties and the like it presents many advantages over condensed milk.

Produced and dried under the almost ideal conditions attained by some manufacturers from milk fed on English or colonial pastures the product possesses the essential " goodness " referred to above. From long and varied experience of its use in war, and in peace, I suggest that milk powder presents the best solution at present available of the manifold difficulties indicated above as associated with " The Milk Problem in Hot Climates."

A Plea for a more Vigorous Supervision of the Cowshed. The Duties and Powers of the Sanitary Officers in Relation Thereto.

By Charles E. Goddard, O.B.E., M.D., Medical Officer of Health, Harrow. (Fellow.)

IT must be, I think, generally acknowledged that all is not well in the matter of milk production in this country, in spite of the fact that the British are the pioneer race in public health work, and in spite of the fact, too, that so much good work has been done in the cause during the last few years.

Many years experience in cowshed inspection leads one to believe that very little real effort has been made by the farmer himself to improve the conditions under which milk is produced, and the improvements, such as they are, have usually been forced upon him by public health authorities and by public opinion !

Since the Government cannot, even if it would, undertake the direct provision and control of model farms and laboratories we must perforce deal with the ordinary cowshed as we find it, with the common labourer as a milker, and with the farmer as we see him, remembering the fact that the milker is too often a very ignorant, prejudiced person, albeit very hardworking, and that the farmer, usually devoid of scientific knowledge, is out for the best cash returns he can get, regardless of method, and too often of principle.

I may preface this short paper then by stating, without fear of contradiction, that the conditions found in the majority of cowsheds are a positive disgrace, a reproach to our sense of what is essential in farm sanitation, and that they demand a more serious attention on the part of the sanitary officers, with a view to the attainment of a much higher standard.

I do not suggest that we can hope, at these farms, to obtain results comparable with those obtained by the Walker-Gordon system, or the Grade A, certified methods ; we cannot, but we can, and we ought to be able to induce a farmer to send out a milk which is not laden with manure, straw and filth.

Not only is milk polluted at the farm, but its condition is made definitely worse by railway transport, by storage at too high a temperature, by lack of cleanliness, by passing from one vessel to another, and generally by faulty methods.

Our concern to-day, however, relates to the conditions obtaining in the cowshed till the milk leaves the farm.

We may take it for granted that milk as it leaves the clean teat of a healthy animal is always sterile and what contamination takes place must occur between the milking and the transport of the milk.

Let me give you an experience that must be similar and familiar to many of you in making your inspections of the cowshed. Soon after taking up the duties in a new district I made a point of visiting all the yards with the sanitary inspector early one morning, and finding the conditions unsatisfactory sent this letter to each cowkeeper :—

" Dear Sir,—My visit to your premises on the 14th inst. leads me to think that you have not yet realised your responsibility in the matter of milk production. I visited all the cowsheds of the district and found grave defects in the condition of the cows and the milkers. No farm was exempt. Most of the milkers had dirty hands and dirty clothes, soiled with manure and filth. Several owned that they had not washed their hands since getting up ! Instead of a clean smock or overall a dirty sack encircled the waist, and the milkers were nearly all working in the dark. Actually at one farm there was no facility for sterilising the cans and churns. There appeared to be no towel, soap, or basin handy for use by the milkers, in fact there was no recognition of the need for absolute cleanliness and care so essential to avoid contamination of the milk by particles of dung and filth.

" To speak plainly, these ancient methods of collecting milk must cease, the public demands it and our Council expects their sanitary officers to see that their bye-laws are complied with. We shall continue to visit and inspect without notice, and will point out what is required, and I shall look for your co-operation that there shall be no contravention of the milk regulations. I want to be able to report to my Council that every effort has been made to send out the purest milk that can be produced under the circumstances."

For a time, at any rate, an improvement was noticeable, but what I want you to note is this : That we have here a concrete case of a district with every cow farm at fault, a district, mark you, that was not previously neglected, but evidently visited in the old-fashioned way, and although the best advice had been given was still working under bad methods and conditions.

Now, I contend that to meet these conditions, we have sufficient powers if we will use them, under the Dairies, Cowsheds and Milkshops Order and the regulations which the local Council has adopted.

I believe it is extremely foolish to waste time and energy on a farmer who has no intention of conforming to these regulations, I am ashamed to say that I have wasted many years of my life trying persuasion and gentle means on men who I found later only understood the language of the law court !

When once you have made up your mind that the cowkeeper means to defy you let me urge you to prosecute him at once. I can assure you that a conviction has a most salutary and beneficial effect on the surrounding district, every yard is brushed up, all the small sanitary details are carefully performed and the work is much lightened, at any rate for a time.

Much depends, of course, on the constitution of your Council. If the farming interest is too largely represented your recommendations will generally be ignored, and your efforts to improve conditions at the farm will appear fruitless; but constant supervision, with tact, will eventually break down all prejudices and help to educate local public opinion in favour of better methods, except in the case of a certain few who resent all advice, and defy any official who attempts to improve conditions.

It is understood, of course, before prosecution, that many visits have been made and cautions given, it is taken for granted that the Medical Officer never makes inspections alone, and it is wise to include several summonses in respect of each offence or count.

Accompanied by your sanitary inspector, who takes careful note of every detail of importance in his book, you are not likely to miss many points, and the case must be strengthened on all those upon which you agree. May I digress and take this opportunity of offering a small tribute of praise to the loyalty, efficiency, enterprise and integrity of the modern sanitary inspector, and of saying how indispensable is his assistance, as a colleague, in every department of health work, and especially in the crusade for a better milk supply.

Whether you find the sheds in good condition or not, you might feel disposed to send each owner recommendations which will assist those who are desirous of attaining a higher standard. The following are appropriate :—

An hour before milking, the floors, channels and gullies to be cleared and washed down. Each cow to be groomed, udders and teats sponged and dried before milking. A clean overall to be worn whilst milking. Basin, soap and towel to be supplied with hot water within easy reach of each milker. Hands to be washed after each cow is milked. Milking should be done with dry hands, but on no account should they be moistened in the milk, or spat upon. The gauze for straining must be renewed or boiled daily. All utensils to be sterilised twice daily, stools washed, etc. At the same time send a copy of your regulations so that no one can plead ignorance of the Council's requirements.

Let me give you a few general statements for consideration.

Dirty conditions are often due to economic circumstances, the farmer will not pay a sufficient wage to secure intelligent labour. No man should be expected to be responsible for more than twelve cows. The farmer is too anxious to economise when water is measured by a meter. Where large numbers of cows are kept it would be possible to engage a strong youth to be wholly employed in removing manure during the winter months, and for this purpose rails could be laid down the central gangway and a small truck used to run the manure to a spot a sufficient distance from the shed.

If consulted about the construction, remember the advantage of the "feeding passage," discourage the use of wood altogether, have top light, floors of concrete, corners rounded, a 15″ glazed stoneware pipe makes the best trough. Cubic space to reach 800 cubic feet for each animal. Have the floor of the byre just deep enough for the animal to rest comfortably, defæcation will then usually be performed into the channel. The "grip" must empty itself into a gully *outside* the shed. Take care that your regulations have been approved by the Ministry and duly signed and sealed by your Council. Remember in this connection that the Ministry now sanction the inclusion of clauses requiring the milker to wear suitable clothing, and the whole cow to be in a clean condition instead of the udders and teats only. Remember, too, that feeding has but little influence on the quality of the milk, and that the evening milk is richer than that of the morning. Do not be satisfied with the veterinary inspector's quarterly "nil" report, try and discover that tuberculous udder that is said to occur in at least two per cent. of the herd.

Finally, I must express regret that scores of details must be omitted in this brief attempt to place before you some of the causes of our present dirty milk supply, and that I can only offer you a few of the remedies that are within our reach to compel the farmer to supply, at whatever cost, a safe, pure and wholesome milk, the best known food for the infant and the invalid.

A Contribution to the Statistical Study of Tuberculosis.

By A. M. N. Pringle, M.B., C.M., D.P.H., Medical Officer of Health, Ipswich. (Fellow.)

I PROPOSE to confine my observations entirely to facts in connection with tuberculosis that have come under my own personal purview. I do so because I believe that the study of tuberculosis has been hampered by the influences of traditions religiously preserved in the text-books, to a greater degree perhaps than any other disease.

Prior to the introduction of the notification of tuberculosis the sole available source of information as to the prevalence of the disease was the return of deaths. The return indicated the broad general facts that tuberculosis was the cause of a high proportion of the total deaths from all causes at all ages, and that about 75% of the deaths from tuberculosis were referred to pulmonary tuberculosis.

Certain observers, carrying their investigations back many years, found that the death rates referred to tuberculosis had steadily diminished over a long period of time, and the suggestion was thrown out that if the rate of fall thus demonstrated continued, then the disappearance of the disease was within measurable distance. The statement was made that since this fall had occurred without special efforts having been directed to the treatment and control of the disease, its rate would be accelerated as soon as schemes of treatment and prevention were put into force and pursued with activity.

Hence the tuberculosis campaign.

Impressed with the results achieved by these patient investigators, I resolved to examine the records of deaths in Ipswich from 1841 to the present time, and I now present you with the statistical data evolved.

It is a fundamental axiom of statistics that the value of a series increases with the numbers involved.

In a small town such as Ipswich numbers can only be obtained by studying records over a long period of time.

Further, in a limited community, considerable fluctuations are to be expected between individual years. Therefore, in order to avoid as much as possible these disturbing influences, I have collected the data into totals for decennial periods.

The death-rates are calculated on decennial populations corrected from the census figures up to 1910, and are therefore sufficiently near the truth to afford reasonably comparative data.

In most statistical surveys of tuberculosis it is the custom to divide up the figures obtained according as the site of the lesion is (*a*) pulmonary or (*b*) some other part of the body. In my statistics I have amplified the division a little further, for a definite reason, to be explained later, differentiating pulmonary, abdominal, general, cerebral, and all other varieties.

I give a table showing the numbers of deaths referred to each of these varieties in the eight decennial periods since 1841, together with the corresponding death-rates :—

Decennium.	Pulmonary Tuberculosis.		Abdominal Tuberculosis.		Cerebral Tuberculosis.		General Tuberculosis.		All others.		All Forms.	
	No.	D.R.	No.	D.R.	No.	D.R.	No.	D.R.	No.	D.R.	No.	D.R.
1841–1850 ...	1,084	3·74	133	0·45	2	0·00	1	0·00	32	0·11	1,252	4·32
1851–1860 ...	1,081	3·06	194	0·55	8	0·02	—	—	40	0·11	1,323	3·72
1861–1870 ...	1,202	2·98	161	0·40	17	0·04	3	0·00	48	0·11	1,431	3·55
1871–1880 ...	1,201	2·57	164	0·35	59	0·12	21	0·12	49	0·10	1,495	3·20
1881–1890 ...	1,131	2·09	122	0·22	166	0·30	39	0·07	39	0·07	1,497	2·77
1891–1900 ...	1,049	1·69	54	0·12	130	0·20	44	0·07	69	0·11	1,366	2·20
1901–1910 ...	996	1·42	49	0·07	116	0·16	83	0·11	62	0·08	1,306	1·84
1911–1920 ...	895	1·17*	63	0·08*	94	0·12*	58	0·07*	54	0·07*	1,164	1·52*

* Approximate.

This table shows a very great fall in the death-rates ascribed to pulmonary and abdominal tuberculosis, a considerable increase in the death-rates from cerebral and general tuberculosis, and a very great fall in the death-rates from all forms of tuberculosis combined.

I show charts indicating in graphic form the death-rates from the above varieties of tuberculosis, and the proportion borne by the deaths from each variety of tuberculosis to the total deaths from tuberculosis.

If we concentrate for a moment on the chart we are struck immediately by one arresting feature. The enormous preponderance of the pulmonary variety is merely in accordance with experience, but it is of high interest that the excessive proportion of the pulmonary variety in the years 1841-1880, as compared with 1881-1920, is associated with the low proportion of the cerebral and general forms. In fact, cerebral tuberculosis, which to-day is the cause of the greatest number of deaths from tuberculosis next to the pulmonary variety, was not really recognised until after the fourth decennium. The same applies to general tuberculosis. As a set-off to this is the excessive number of deaths ascribed to abdominal tuberculosis. Nevertheless, when we consider the deaths from tuberculosis as a whole, there is evidence, in my opinion ample, of non-recognition of one variety to a large extent balancing over-recognition of another, the ultimate result being to

establish with a considerable degree of accuracy a general approach to verity of the death-rates ascribed to tuberculosis as a whole.

For this reason, amongst others, the other charts and tables deal with deaths from tuberculosis without reference to the part of the body stated to be the site of the fatal disease.

We may leave this part of the subject with the observation that at the present day deaths from tuberculosis include some 77% ascribed to the pulmonary variety, 8% to the cerebral, and 5% each to the abdominal, general, and all other groups.

In dealing with the mortality statistics of tuberculosis we must remember that a death certificate contains, or ought to contain, and I believe from time to time does contain, an accurate statement of the cause of death. Applied to tuberculosis this is found to yield some highly interesting results. We have information nowadays, derived from notification and subsequent examination, of a very large number of proved tuberculous persons.

My own data show me that whilst the vast majority of fatal cases have the condition notified as the cause certified, others, and these not a few, have the cause of death given as some other form of tuberculous disease, if tuberculosis was the cause. Tuberculous meningitis is not unfrequently the cause of death in pulmonary tuberculosis, and general tuberculosis is frequently the cause of death in bone tuberculosis.

Therefore, statistics derived from death certificates alone are not necessarily accurate statements of primary sites of disease. Neither are notifications.

These hints bring me to the chief reason for considering tuberculosis statistics as a whole. As one of the oldest tuberculosis officers in England and Wales, I have come, gradually, to the conclusion that the labelling of this person as a sufferer from tuberculosis of the lung, of that as a case of tuberculosis of the hip, and of this other as a case of abdominal tuberculosis (whatever that may connote) is bad.

Clinical tuberculosis (I use the term advisedly) is not a local disease in my opinion. It is a constitutional condition with predominant local manifestations. Hence the pulmonary, abdominal, or other variety. Hence the deaths from one variety of tuberculosis of cases certified to be suffering from other forms. Hence general tuberculosis. Hence my tables dealing with tuberculosis as a whole and ignoring local sites.

I believe that tuberculosis is primarily a disease of the Lymphatic system.

A table is given showing the decennial totals of deaths from tuberculosis according to sex, the corresponding death-rates and the resulting proportional ratios :—

Decennium.	Males.				Females.				Total.			
	D.	D.R.	P.R.	% of Deaths from all causes.	D.	D.R.	P.R.	% of Deaths from all causes.	D.	D.R.	P.R.	% of Deaths from all causes.
1841–1850...	595	4·3	100	18·3	657	4·3	100	19·7	1,252	4·3	100	19·0
1851–1860...	616	3·7	86	15·8	707	3·7	86	17·7	1,323	3·7	86	16·8
1861–1870...	693	3·7	86	15·6	738	3·3	76	16·4	1,431	3·5	81	16·0
1871–1880...	747	3·4	79	14·1	748	3·0	69	14·8	1,495	3·2	74	14·4
1881–1890...	744	2·9	67	14·5	753	2·6	60	14·8	1,497	2·7	63	14·6
1891–1900...	719	2·4	56	12·7	647	1·9	44	11·7	1,366	2·2	51	12·2
1901–1910...	711	2·1	48	13·2	595	1·6	35	11·4	1,306	1·8	41	12·3
1911–1920...	617	1·7*	40*	11·7	548	1·3	30*	10·3	1,165	1·5	35*	11·0

* Approximations.

Accepting these figures for the moment at their face value, it is evident that there has been a very substantial fall in the death-rate from tuberculosis, particularly amongst females.

It is notable that from 1841-1860 the death-rates ascribed to tuberculosis were identical for both sexes. In 1861-1870 the male death-rate remained stationary, but the female death-rate dropped about 10%. Thereafter the male death-rate also dropped, but its rate of fall has kept it about the same relative position behind the female.

It is advisable to give some consideration to the validity of these figures.

The view is not unreasonable that the figures of the last twenty years are probably near the truth.

If this be accepted, then it should follow that we would expect that the relative proportions of deaths ascribed to the various forms of tuberculosis should remain substantially the same, since no evidence exists that the tubercle bacillus has varied its selective tendencies within the time covered by my statistics. Thus we should expect, as already stated, throughout the period about 77% pulmonary tuberculosis, 8% cerebral tuberculosis, and 5% each of abdominal, general and all others.

Now I have shown in charts that this relation has not been maintained. Therefore the statistics from the site point of view do not stand the test of critical examination. But, and this is important, the total number of deaths ascribed to tuberculosis, all forms, maintains its relative position throughout the decennial periods. The general correspondence in the contour of these curves throughout the period is very striking.

Therefore, I think it is permissible to argue from the relative positions of the curves during the last 40 years (when a fairly high degree of accuracy of death certification prevailed), as contrasted with the first 40 years, that

the degree of correspondence of the curves of the two periods is so close as to justify the opinion that the data from which they are composed are largely identical. I think the figures for the 1841-1850 decennium are too high, but even they are not out of all proportion to the subsequent decennia.

In considering the value of these earlier statistics we must remember that errors of certification of causes of death are not, and in the nature of things cannot, be always on one side. There is just as much likelihood of an error of commission as of omission, and therefore it is just as likely that cases of tuberculosis were certified as dying from another cause as that cases of death from other causes were certified as due to tuberculosis.

We have already seen that tuberculous meningitis and general tuberculosis are now much more frequently given as the cause of death than they were over 40 years ago, to say nothing of their practical non-recognition 80 years ago. Yet these existed 80 years ago probably in the same proportion as they do now.

We have seen that the curve of the death-rates from all forms of tuberculosis, at all ages and for both sexes, is one showing a remarkably constant correspondence as between one decennium and its immediate neighbours.

Therefore the suggestion has been thrown out that the data on which the curve is based are just as likely to be true of one decennium as of another. Now we know that, at any rate, the data of the last 20 years are reasonably near the truth.

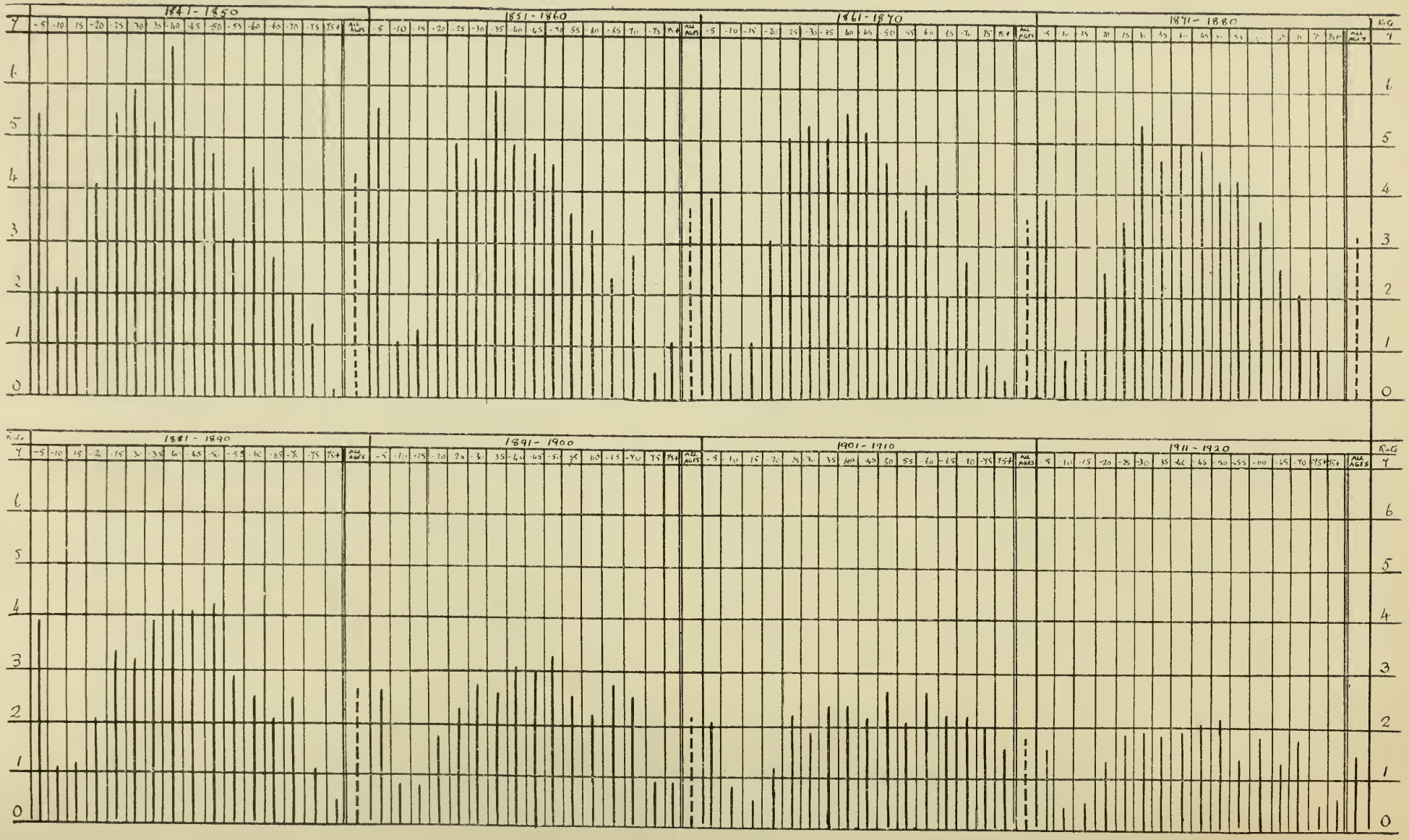
Thus it is possible to suggest that the earlier data, with strictly comparable and corresponding curves, are also reasonably near the truth.

If, therefore, it could be shown that the degree of correspondence of the curves at all ages was similar for every age period, and that it was possible to show a comparable and mutually complementary series for quinquennial age periods up to 75 years of age, then indeed there would be established a strong case for the essential validity of the series.

Further, if the variations recorded could be shown graphically to merge, without undue disturbance of gradation, into the more or less established data of the present time, considerable support would be lent to the substantial general validity of the earlier statistics.

I direct your attention now to charts in which the death-rates from tuberculosis, the proportional ratios, and the per cent. proportion of the deaths from tuberculosis to all other causes, are shown in 5 yearly periods up to 75 years of age for each decennium since 1841.

These charts show in a very remarkable manner a striking degree of homogeneity. In my view, they establish quite conclusively the fact of a fall in the death-rate from tuberculosis, and they also establish the general comparability and credibility of the data compounding the series.


1841 - 1850
1851 - 1860
1861 - 1870
1871 - 1880
1881 - 1890
1891 - 1900
1901 - 1910
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DIPHTHERIA.

A Consideration of the Methods of Spread and of Prevention : Carriers and their Treatment.

By F. C. Linton, M.A., M.B., D.P.H., Medical Officer of Health, Tunbridge Wells. (Member.)

TWO considerations have prompted me to put before you my experience of the methods of spread of Diphtheria :—

The first is that, in the table of deaths from notifiable infectious diseases in the 1919 Annual Report of the Chief Medical Officer of the Ministry of Health, Diphtheria, with the exceptions of Tuberculosis and Acute Pneumonia, is seen to take the heaviest toll from our midst ; the same observation holds good on looking back through many years of Reports ; save that Pneumonia was not included in the earlier tables. 53,918 cases of Diphtheria were notified in England and Wales in 1919 ; one in eleven of these cases, mostly young persons, died : the prevention of its spread is, therefore, a matter of prime importance, and one that every Medical Officer of Health has to deal with frequently, and, in dealing with infectious diseases, so much is left to his judgment and initiative, that wide differences of method must exist in different districts : consequently discussion of methods of procedure and of results should prove both interesting and helpful.

The second consideration which influenced my choice of this subject is that, as Medical Officer of Health of a small borough of some 36,000 inhabitants, I am one of a body of Medical Officers who have the appreciable advantage of being in direct personal touch with cases or carriers of a disease such as Diphtheria, throughout the period of infectivity. Briefly, it is my duty to endeavour to trace and to deal with the source of infection in each case, and I also act as medical attendant upon the patient throughout his stay in hospital, be his exit of what nature it may.

Means for Dealing with Infection.

In addition to the usual facilities for hospital isolation, disinfection, and testing of drains at a house in which a case occurs, there is at my disposal a bacteriological laboratory in which I am free to examine as many specimens from contacts as I care to take, without having the feeling that I am thrusting a large burden upon other shoulders, when, as occasionally happens, it is advisable to examine a large number of contacts. A feeling of complete freedom in this respect is an asset not to be despised, and has

led to the solution of problems which might otherwise have gone to swell the number of the unsolved.

Further, there is a well-equipped County Laboratory at Maidstone, where virulence tests can be made ; this completes the list of requirements.

I propose to dismiss here, with a brief word, the arrangements for dealing with factors of spread other than the animate carrier of infection, as I believe these factors are, save in rare instances such as milk or food infection, of relatively slight importance. Disinfection of the patient's bedroom with Formalin or Bacterol vapour is undertaken in each case ; and drains are tested, to see if breathing of sewer gas has been a factor in lowering resisting power. With rare exceptions, all cases of diphtheria in my district are removed to hospital.

Carriers of Diphtheritic Infection.

These fall into two main categories :—

Class A.—Those in whom no history of a prior attack of Diphtheria is obtainable.

Class B.—Those who have suffered, or are suffering from, an attack of Diphtheria, generally in a site other than the fauces.

It will be observed that I here use the word " carrier " to represent all who harbour the Klebs-Löffler bacillus. The paper by Fraser and Duncan published in the *Lancet* of November 13th, 1920 (to be referred to later, in considering treatment) has given rise to discussion between Brownlie and Duncan on the question of distinguishing between " carriers " and " positive throats." I prefer with Brownlie to retain the one term " carrier " for all ; classifying for convenience, those who are known to have harboured the K.L. Bacillus for three months or longer as " persistent carriers."

Class A.—These carriers are in practice usually discovered either in taking specimens from contacts with a case of diphtheria, or in the course of medical inspections of school children, when cases belonging to Category B are suspected, and specimens taken.

When a carrier is detected, it is my practice to isolate him or her as completely as possible, and this is generally achieved by removal to hospital.

I am well aware that to some Medical Officers of Health, it may seem an unjustifiable expense to remove to hospital carriers who *may* be harmless and may clear up quickly, but unless the home arrangements are unusually satisfactory, there is no feeling of safety in leaving a carrier outside the hospital : in no case have I left at home a carrier of Class A of over four weeks' persistence after discovery.

In one instance only have I experienced serious difficulty in persuading a carrier to come into hospital for treatment. Five cases of diphtheria, four

of whom were children of the carrier, and one a cousin's child next door, occurred during four weeks. The woman then consented to come into hospital, clearing after two months' treatment.

The Scottish Board of Health has passed important regulations with regard to carriers, which came into force in Scotland on March 1st, 1921.

These regulations give the Local Authority power to deal with a person adjudged to be a carrier of an infectious disease in the same manner as if he actually suffered from the disease.

Before a person is deemed to be a carrier he must be certified as such by the Medical Officer of Health, and also by another registered medical practitioner, such certification to have effect for a period not exceeding three months. Further examinations may be made at any time after the date of a certificate, and the carrier may demand to be re-examined during the currency of a certificate, on giving the Medical Officer of Health not less than 48 hours' notice in writing. Provision is made for an appeal to the Board by a person certified to be a carrier.

These seem reasonable regulations, providing as they do, suitable safeguards against too much red tape in dealing with those who are unlucky enough to be "carriers." Similar regulations are surely required for England and Wales, and it is to be hoped they will speedily be framed.

Class B.—Carriers who have, or have recently had, Diphtheria, usually in a site other than the fauces.

(1) *Carriers of Nasal Type.*—These are, in my experience, the most frequently discovered source of spread of infection. I have found children with the typically inflamed contracted nostril, usually crusted and sore and with a history of bleeding, either in the home, or in the school class, in following up a case of diphtheria.

Generally the parent says the child had a little bit of a headache or "wasn't just himself," adding perhaps that she kept him off school for a day or two, but didn't think much about his nose being sore. Now that the School Medical Centre is an institution, I not infrequently catch these cases before any damage is done, the parent considering it worth while to bring the child to get some ointment for the nose, or else the teacher, who is warned to be on the look-out for sore nostrils, sending the child for inspection.

(2) *A Discharging Ear,* in which the K.L. bacillus is lodged, is another source of infection : here, if there be doubt of the source of infection, further test than the examination of a 16-hour serum culture and the discovery of a polar-staining bacillus like the K.L. bacillus is desirable, on account of the possible presence of other polar-staining bacilli morphologically resembling the K.L. bacillus, *e.g.*, B. Xerosis or B. Cerumineus.

(3) *Wound Diphtheria.*—The first wounded to appear in this country after the outbreak of hostilities were Belgians, and in Tunbridge Wells these were received in a large house converted into a V.A.D. Hospital, staffed by local ladies. In this hospital a small outbreak of diphtheria occurred whose history I briefly record.

On 23rd October, 1914, two specimens from the throats of Belgian patients were sent to me, and in these I found the K.L. Bacillus on the 24th. I visited the hospital the same day, taking specimens from the throats of 42 contacts, finding amongst these 4 more patients and 2 nurses carrying the K.L. Bacillus. Further batches of specimens were sent by the Medical Officers to the V.A.D. Hospital during the next few days, but all proved negative. The six Belgians were removed to the Isolation Hospital; and the two ladies were isolated at their homes under medical treatment, where they soon cleared up.

The Surgeon who had most of the cases under his care informed me that one of the positive cases, a man with a severe wound in the right shoulder from an expanding bullet, had shewn no tendency to heal up during the three weeks he had spent in the hospital. I took a swab from this wound when I first dressed it in the Isolation Hospital, and found the K.L. Bacillus present. The wound commenced to heal after anti-toxin was administered, an unhealthy greyish slough coming away as membrane does from the throat. The infected persons were his near neighbours in the Auxiliary hospital and nurses who had been much in contact with him: I had no doubt that his wound, which was acquired some weeks before, had introduced and spread the infection, as it had presented the same appearance of grey slough on admission.

(4) *Animal Carriers.*—Of these I must confess I have little to say: the cat has long been reputed to be a possible diphtheria carrier. Savage has performed experiments which go to prove that kittens cannot carry the K.L. Bacillus. Simmons, however, records (*Medical Science*, April, 1921), a definite instance of an elderly lady who developed a fatal attack of faucial diphtheria after fondling a cat which had been ill for one week before her illness began. Throat cultures from the cat and the patient showed morphologically similar organisms resembling diphtheria bacilli and their virulence for guinea pigs was the same. The cat was killed and, on post mortem, a small ulcer was found covered with a yellowish membrane on the upper surface of the left nasal fossa, yielding diphtheria bacilli on culture. A second cat which had played with the first, yielded a throat culture showing morphologically typical diphtheria bacilli: this cat died after eight days' confinement in a cage, and post mortem showed small

membranous particles on the vocal cords from which virulent diphtheria bacilli were grown.

Savage's experiments in infecting mucous surfaces were performed, if I read the description correctly, upon kittens. Might not a possible explanation be that the kitten is immune where the cat is not ? An analogy could be found in the immunity from Scarlet Fever of infants under one year, changing to susceptibility soon after.

Lastly, what of the persistent carrier and his treatment ? Here I must confess that I have so far met with no form of treatment that has been, in my hands, an unqualified success. Various remedies (so numerous as to indicate their relative inefficiency) have been tried locally, and I have known intercurrent microbic infections, such as influenzal colds, to clear up all but the most persistent carriers : but the most persistent have resisted all these things. Vaccine treatment is perhaps more promising. So long ago as 1910, I tried an autogenous vaccine upon a boy of 12 years, continuing until he received a 50 million dose of dead bacilli : but he had no re-action, nor did his throat infection seem a whit the better. This boy's K.L Bacilli remained virulent for 8 months : he was discharged from hospital when virulence disappeared. After another month the bacilli disappeared finally.

I made no further trial of vaccine treatment until recently, when I saw Brownlie's excellent results recorded in the *Lancet* of March 27th, 1920. I tried vaccines (not autogenous) upon two carriers, but without meeting with definite success.

Further, on seeing Fraser and Duncan's favourable results with detoxicated vaccine recorded in the *Lancet*, Nov. 13th, 1920, I made prolonged trial of it upon a persistent carrier. A dosage six times the maximum used by the above writers was reached, but the throat did not clear until three weeks after the treatment had ceased.

Invalid Wines and Pudding Powders.

By H. Scurfield, M.D., D.P.H., Formerly Medical Officer of Health, Sheffield (Fellow).

THE two questions of wines for invalids and substitutes for eggs in the making of custards and puddings has recently been reported on by our Public Analyst.

Invalid Wines.—I take it that the word "wine" means the fermented juice of the grape, and that if a customer asks for wine and receives a liquid which contains no alcohol, he is not getting what he asks for. The Sheffield Public Analyst (Mr. John Evans), reported that two of these so-called wines were quite free from alcohol and contained, respectively, 8·5 and 4·7 grains of Salicylic Acid per pint.

The recommendation of the Departmental Committee was that a liquid of this description should not contain more than one grain per pint of Salicylic Acid. As these liquids are intended for the use of invalids, it seems undesirable that the limit recommended by the Departmental Committee should be exceeded. This limit is not binding at present.

I understand that the Metropolitan Magistrates have dismissed cases where non-alcoholic drinks contained from 6 to 10 grains per pint of Salicylic Acid, and that the Bedfordshire Justices have convicted in a case of raisin wine in which 9·62 grains of Salicylic Acid per pint were found.

Custard and Pudding Powders.—With the exception of one powder which corresponded to dried egg in composition, the powders analysed by the Sheffield Public Analyst were divided by him into two groups.

(*a*) Effervescing Farinaceous powders, consisting essentially of rice, maize and arrowroot starches or mixtures of these, tinted with a yellow dye, together with the acidic constituents acid tartrate or acid phosphate, and

(*b*) Non-effervescing farinaceous powders, consisting essentially of very fine starchy matter, either maize or a mixture of maize and arrowroot starches, with possibly desiccated milk in some. They were all tinted yellow.

Neither of these groups of powders in any way represent the food value of eggs. They are variously made up of mixtures of baking powder ingredients, starches colouring matter, flavouring matter, and possibly in some cases desiccated milk. The amount of fat and protein is very small. They produce a mechanical effect in cooking similar to that of an egg, but in the

Analyst's opinion, the title " egg substitute " or " egg powder " is a misnomer. The Analyst further states that in March, 1918, maize cornflower could be purchased in packets weighing 120 grammes for 1½d. each, whereas the price of nine of the preparations under discussion was as under :—

Effervescing Powders.

	1.	2.	3.	4.	5.	6.
Weight in grammes ...	30	36	24	25	33	20
Price	1½d.	5½d.	1d.	1½d.	5½d.	1½d.

Non-Effervescing Powders.

Weight in grammes	68	43	65
Price	5½d.	1½d.	1½d.

The composition of a dried egg is, roughly speaking, half protein and half fat, and these powders consisting, practically speaking, of tinted flour with or without baking powder, in no way resemble egg in composition.

When margarine came into use, it was described as butterine, butter substitute, etc., but it is quite accurate (or was before the discovery of vitamines) to describe margarine as a butter substitute seeing that it is a fatty food of the same nature as butter. The legislature, however, took steps to prevent margarine being sold under any name suggesting that it was butter. I suggest that there is a much stronger case for taking steps to prevent tinted flour being sold under names suggesting that it is a substitute for egg. Recent research work with regard to vitamines still further strengthens the case, as cornflour contains no vitamines, whereas eggs are plentifully supplied with vitamines and, moreover, dried eggs probably retain these vitamines unimpaired.

I move that the sale of so-called wines and of custard and pudding powders under misleading titles be referred to the Council of the Royal Sanitary Institute, with a view to their considering the advisability of taking up the matter with the Ministry of Health.

For resolution see page 244.

CONGRESS RESOLUTIONS.

The following resolutions were passed in Conference II., Medical Officers of Health :—

> RESOLVED that the Congress of the Royal Sanitary Institute held at Folkestone, recommends the Council of the Institute to bring under the notice of the proper authorities the desirability of immediate steps being taken to provide for the application in this Country of Ordinances to ensure a safe milk supply, somewhat on the lines of those in operation in various cities in the United States of America.

This resolution was sent to the Ministry of Health, and in reply they "referred the Institute to the Milk and Dairies Consolidation Act, 1915," and in a further letter stated "that the Ministry was not yet in a position to make any statement as to the probable date on which the Milk and Dairies (Consolidation) Act, 1915, will come into operation."

> RESOLVED that the sale of so-called wines and of custard and pudding powders under misleading titles be referred to the Council of the Royal Sanitary Institute with a view to their considering the advisability of taking up the matter with the Ministry of Health.

This resolution was forwarded to the Ministry, who replied as follows : "No action has been taken by this Department regarding the sale of custard and pudding powders under misleading titles. The sale of these articles is generally within the provisions of the Sale of Food and Drugs Act, 1875."

CONGRESS AT FOLKESTONE.

CONFERENCE III.—ENGINEERS AND SURVEYORS TO COUNTY AND OTHER SANITARY AUTHORITIES.

Presidential Address by H. P. Boulnois, M.Inst.C.E. (Fellow).

IT is just 19 years ago that I had the honor to take the Presidential Chair at the first conference of Municipal Engineers, which was held in connection with the congresses organised by the Royal Sanitary Institute. Since that date these conferences have formed part of all the subsequent congresses. At that Conference I naturally chose, as a subject, the work devolving upon the Municipal Engineer and dealt briefly with the following matters :—

Engineering, viz., Roads, Sewerage, Sewage Disposal, Water Supply, Bridges, Flood Prevention, Sea Defences, Lighting and Tramways.

Architecture, viz., Public Offices, Workmen's Dwellings, Mortuaries, Abattoirs, Public Conveniences, Baths and Wash-houses, Isolation Hospitals, Markets, Libraries, Police Stations, etc.

Miscellaneous, viz., Collection and Disposal of House Refuse, Street Cleansing and Watering, Parks and Pleasure Grounds, Cemeteries, etc., etc.

Since that date the scope of the work of the Municipal Engineer has materially increased and his duties and responsibilities have widened. I propose in this address to touch only on some of the advances that have been made in Municipal Engineering during the years that have passed since 1892, when I gave the address referred to, confining myself to such subjects as come, more or less, under the head of sanitation.

Roads.—The construction and maintenance of our roads have, of recent years, become of National instead of Communal importance, due to the altered conditions of traffic, and new methods to meet these changes have been found necessary. It would stretch this address to an inordinate length were I to attempt to give even a short resumé of the great changes which have taken place in the procedure of road surfacing. It must be remembered, also, that this Conference is held in connection with a *Sanitary* Congress ; suffice it to say that the question of roads will only be dealt with from the sanitary aspect of these altered methods of construction. It may be conceded, I think, that in this direction the new methods have given the roads impermeable surfaces ; that dust has been minimised, that there is now little or no mud and that the need for watering has considerably diminished.

It is obvious that there are many advantages on sanitary grounds alone in the construction of our modern roads as compared with the ordinary water-bound macadam roads of 20 years ago.

With regard to *Sewerage* no great changes have taken place. Owing, however, to more careful attention to the calculation of sizes of sewers and their gradients we hear of fewer complaints as to smells arising from them or the need for some special means of ventilation.

As to *Sewage Disposal,* considerable strides have been made in the purification of sewage by bacterial treatment culminating in the activated sludge process.

This method is probably familiar to you, but shortly it consists in forcing air through the sewage in very finely divided bubbles so that the micro-organisms required for the purification of the sewage can be thoroughly mixed with the sewage in the presence of air. It is claimed for this process that a clear non-putrescible effluent is produced, that the amount of residual sludge is less than that from other methods, and is in a more finely divided condition and that it is richer in nitrates than ordinary sludge provided that the sewage is domestic and not overburdened with trade effluents. The system is still on its trial and requires somewhat skilful supervision, but it appears to have a future, especially if more nitrates can be fixed in the sludge and thus become a useful fertiliser for our land. Dr. G. McGowan in a paper on " Nitrogen in Sewage," given at a recent meeting of the Institution of Sanitary Engineers, stated that about 633 tons of nitrogen a day were evacuated by our population. Assuming that one-half this population drained into the sewers, this is equal to 316 tons a day, and he estimated that about 70 tons a day of nitrogen were required for fertilizing purposes on the land at present under cultivation. It is regrettable that sewage cannot be turned into more profitable use. We find that some 300 tons of nitrogen are thus daily wasted, and it is to be hoped that the future may develop some scheme by which sewage can be made of more use for agricultural purposes.

With regard to *Water Supply,* many works were compulsorily stopped owing to the great war, and there is not much to say with regard to any improvements or alterations in this service. There has, however, been considerable research work during the last few years as to the flow of water in pipes and channels with useful results. The questions of the bacteriology of water has also been studied by scientific investigators, which have assisted in some of the problems of sources of supply, storage and filtration. The chlorination of water as a method of purification has made considerable strides and was found to be invaluable for military supplies during the war. Reinforced concrete pipes have developed in construction especially

in America, where this description of pipes of large diameter have taken the place of cast iron pipes in many cases, and further developments in this direction are anticipated. Owing to the cost and shortage of fuel, wind mills or engines of improved type have increased for small installations, care being taken to provide them with some "stand by" power, either hand or horse, as wind is rather a fickle servant.

The question of a communal supply of hot water to groups of cottages and modern villages has received considerable attention, but there is a difficulty in providing sufficient storage to meet the excessive demand at certain hours of the day.

The next item on my list is *Bridges* and does not come under sanitation. Suffice it to say that there have been great advances in the use of reinforced concrete in their construction.

With regard to *Flood Prevention* in towns or where there are dwelling houses, it is evident that this is important from a health point of view. Unfortunately in many cases this flooding is not due to local conditions but to causes over which the Municipal Engineer has no control, as the flooding frequently arises from the neglect of other authorities, either above or below, the area of the mischief. It is to be feared that flooding will never be eliminated until there are more River Conservancy Boards or Drainage Boards constituted with full powers over long lengths of rivers or streams.

The remaining Engineering items of *Sea Defences, Lighting, and Tramways*, do not come under the head of Sanitation, and I will therefore pass on to the important question of *Workmen's Dwellings*. You are all aware of the shortage of houses that occurred owing to the practical cessation of building during the war and the insatiable demand for habitations which followed. There ensued a veritable "house famine" after the armistice, and had it not been for the intervention of the Government, serious results might have followed. Even now the problem of the erection of houses at economic rents has not been solved, and it is a serious question as to whether trouble will not arise in the future over the question of what we may call these "premiated" houses and their favoured occupiers. Owing to the present cost of labour and price of materials it seems to be impossible to erect cottages suitable for the labouring classes at less than £850 to £1,000 each, so that such cottages cannot be let at rentals suitable to the pockets of the class of tenants for which they have been erected and the rent has to be supplemented out of the rates or taxes. This is economically unsound and is equivalent to the old adage of "borrowing of Peter to pay Paul." Fortunately, inventors and others have been occupied in introducing various methods of building which lessen the cost, principally in brick work, and it is to be hoped that the future will produce further developments in this

direction. It is suggested also that compliance with the Building By-Laws of some districts adds to the expense of construction, and there can be no doubt that many requirements of these By-Laws are unsuitable for cheap cottage buildings.

With reference to the remaining subjects under the head of *Architecture* with which the Municipal Engineer has to deal, no great changes have taken place since my inaugural address and they can be passed without any special comments.

With regard to the *Collection and Disposal of House Refuse,* the "Cinderella" of sanitation, some progress has been made in methods of collection due to the introduction of self-propelled vehicles whereby this service has been expedited and more frequent clearances can be effected, but the construction of the bodies of the vans or carts employed in the collection remains much the same, and some drastic improvement in their design is much to be desired. With regard to the disposal of house refuse ; burning in properly constructed destructors still appears to be considered the most sanitary and economical method to be employed in our larger towns and cities.

A short time ago, there was an outcry for economy, and it was felt that the burning of marketable materials was to be deprecated. Several plants on "salvage" principles were installed in various localities with a view to saving materials which could be sold at a profit, such as rags, bottles, tins, paper, etc. These installations do not appear to have met the success which they deserved, owing principally to the increasing cost of labour and the lessening value of the materials saved. It would be well if experiments in this direction could be continued, as it is to be regretted if further efforts cannot be made to rescue some of the more valuable contents of our dustbins from destruction.

In connection with the disposal of home refuse, another method has been introduced since my former address viz., the pulverising or dessicating process in special machinery whereby the refuse is reduced to a powder or poudrette which can be used as a manure for agricultural purposes and has considerable merit for certain localities where a market for this poudrette is available.

With regard to *Street Cleansing* and *Watering,* both of these services have been greatly expedited by the use of mechanically propelled vehicles. Many trials have been made to produce a street cleaning machine which will lift the material from the surface of the road and deliver it into the vehicle itself or into a trailer cart or wagon. None of these vehicles have proved to be very successful, as under certain conditions of our climate the mud or droppings adhere to the surface of the road and cannot be lifted. The

weight of the machine or vehicle also tells against it, but here again further trials may lead to success.

The important question of Town Planning had not been even thought of 19 years ago, and the passing of the Housing and Town Planning, etc., Act, 1909, added enormously to the work of the Municipal Engineer. The principal object of this Act was to give powers to Local Authorities to develop lands on lines of mutual benefit to land owners as well as to the community at large. It would be impossible in such an address as this to give even an outline of this important Act or to deal with the large amount of additional work and responsibility devolving upon the Municipal Engineer where a scheme of Town Planning comes under his administration. In the design of such a scheme the land should be so developed that the interests of the land owners are safeguarded as well as the possible future developments of the town or district in any direction. The Municipal Engineer must also carefully consider all the regulations and instructions emanating from time to time from the Ministry of Health and a large amount of preliminary work must be undertaken before a scheme under the Act is even designed, and the "amenities and conveniences" of the district assured. The Act also deals with insanitary properties and other matters, and if properly carried out should go far to remedy many past evils. It has sometimes been contended that town planning comes more under the professional scope of an Architect, a Landscape Gardener or a Land Surveyor, but I venture to think that the only man who combines nearly all the qualifications of the above professions in his daily practice is the Municipal Engineer and that he is the right official to take charge of such schemes.

Conclusion.—In concluding this short address, I should like to say a few words upon the educational advantages of such conferences as those we are now holding. We are able to compare notes as to what is being done in various parts of the country : we can hear and discuss papers on professional subjects ; we come in contact with men who have made some problem a special study ; our minds are broadened and we are able to emerge from the grooves of daily work which are so fatal to progress, and we are surrounded with an atmosphere of activity and emulation. It is to be regretted that some Local Authorities, and even Government Departments, do not seem to realise that the knowledge and experience thus gained by officials who attend these conferences are of far greater value than the payment of the expenses of the official, and that to grudge paying them is a false economy.

I have been associated with Municipal Engineering for the last 50 years and have closely watched the progress and developments during that long

span of life. The growth and expansion of the work has been phenomenal. The Municipal Engineer has developed into an official of the highest importance in whose hands the health and well being of the country largely rest.

It is curious that the general public do not seem to realise all the work that is done for their benefit by this official and take for granted all the public services of a modern town, without casting a thought upon those who are striving to render the life of the citizens healthy and easy.

Does the ordinary citizen when he draws water from a tap, realise the thought and expenditure of brains that have been necessary to give him this water instead of his having to fetch it himself ? Is he at all thankful that his waste products, both solid and liquid, are so skilfully removed that he has no trouble in the matter ? Does he enquire into the manner in which his excellent streets and roads are constructed, or give any praise to the man who keeps them clean and in good repair ? There are these and many more things that are done for him which he takes for granted and he is probably not even aware of the existence of such an official as the Municipal Engineer, and is only aware of the fact that there is a Municipal Council when called upon to pay his rates.

It is remarkable that the general public seems to be quite unaware of the importance of Municipal Engineering and of the extent to which the labours of the Municipal Engineer may improve the health and surroundings of a district. It is to be hoped that some day this will be realised, that the services of the Municipal Engineer will be appreciated, that he will take his proper place amongst the benefactors of mankind and that he will then receive an adequate reward for his services.

Salvage of House Refuse.

By James Gair, A.M.Inst.C.E., Highways Engineer, St. Marylebone Borough Council. (Member).

THE disposal of the house refuse collected in any Urban area has always been a sanitary work of the utmost importance. Prior to 1914, the methods in general use could be briefly classed under three heads in approximately their order of relative value :—

(1) Destruction by fire.
(2) Conveying to shoot, either by rail, road or barge.
(3) Crushing or pulverising the refuse into a form suitable for use as a fertiliser.

In the years immediately preceding this date there was a marked advancement in all branches of Public Health work, including methods of disposal. Practically all the large cities of Europe and America had adopted some form of destructor, it being generally considered by most engineers that destruction by fire was the only sanitary method of dealing with this problem.

Under war conditions it became difficult to retain the grade of labour suitable for the efficient working of the destructors, and with the then ever increasing difficulty of importing raw materials, it became an urgent necessity to utilise all forms of waste products. Among the general overhauling of methods of dealing with waste products, an examination into the methods of disposing of house refuse soon revealed that large quantities of waste paper, rags, bones, metals, etc., which were urgently required for National purposes, were being destroyed or wasted. In response to the general demand for waste utilisation many Local Authorities took energetic steps to salve or recover their waste, either by means of separate collections, or by screening or sorting the refuse after collection. With the high prices then obtainable for practically every form of waste, salvage proved an excellent paying proposition, quite apart from the reduction in the cost of disposal when undertaken on sound business lines, and consequently many Municipal Authorities have recently re-organised their methods of disposal by installing mechanically operated screens to enable the refuse to be separated into its constituent parts, with the object of salving the saleable material in each part, so that it may be stated that another method of disposal has been added to the three already mentioned.

Before proceeding to briefly review the merits of these disposal methods, it would be appropriate to examine the composition of house refuse, such an analysis shewing (particularly within the London area) that the main

constituents are practically uniform, although the percentage of any one component part may vary in any particular locality, and for the purposes of this paper, the following, taken from the *Engineer's Year Book*, gives a very fair general idea of the composition of the material to be dealt with.

Component parts of refuse.	*Amount in 100 lbs. of refuse. lbs.*
Coal	·35
Coke	·15
Bones and Offal	·37
Breeze and Cinder	25·55
Rags	·40
Paper, Straw, Fibrous material and vegetables ...	13·15
Ash	47·00
Dust and Dirt	9·75
Bottles	·48
Metals, including tins	·68
Crockery	1·72
Glass	·37
	99·97

The author estimates that, approximately, 60 per cent. of the above is combustible, the remaining 40 per cent incombustible, and that two thirds of the total bulk will pass through a 2 in. ring. The calorific value of refuse may be taken as about 20 to 25 per cent. of the value of good steam coal.

House refuse has hitherto been looked upon as something to be got rid of as quickly as possible without any particular regard for the value of any of its constituents. The only attempt made towards utilisation has broadly been, to obtain its calorific value (under 1) or its fertilising value (under 3).

If the only object to be achieved is destruction by fire, then the destructor is assuredly the ideal of sanitary efficiency, but if the destructor is intended to be a means of utilising the calorific content in the refuse, it would appear uneconomical to feed into the furnace 40 per cent. of incombustible material, except that the destructor in this case is used as a sterilising apparatus for the incombustible percentage. This high percentage of incombustible matter may also, to a large measure, account for what has been the great drawback in most destructors—unreliability and irregularity as regards steam raising capacity. If, however, the present form of destructor was economically efficient, there would still be strong grounds for its general adoption, but, unfortunately, owing to heavy working cost, coupled with the high initial outlay involved and the difficulty of utilising a fluctuating amount of steam, very few authorities or their technical advisers consider destruction by fire an economical means of disposal. This is evident when

one considers the vast tonnage of refuse, (about 750,000 tons per annum from the London boroughs alone and approximately 70 per cent. of the total collected) disposed of by means of conveying to shoot (under 2). This method, whatever its disadvantages may be from a sanitary point of view, will doubtless continue in use for many years, but if this were properly carried out for raising specially selected low-lying areas to predetermined levels and covered over with suitable material as the work proceeds, there could be little objection, but promiscuous dumping of refuse should be prohibited.

The disposal of house refuse by means of pulverising or crushing (under 3), to enable the refuse to be used as a fertiliser, has been successfully carried out as a means of disposal in a few instances, notably at Southwark, but it will be apparent upon examining the constituents of the refuse that a considerable percentage, even when ground, must still be in an insoluble form (broken glass, crockery, tins, etc.), and of little fertilising value, unless some preliminary sorting process takes place before crushing. Also, the high proportion of breeze and cinders renders the powdered material only of use on certain soils. The value of this process, therefore, largely depends upon the responsible officer being successful in obtaining suitable markets for his powdered refuse so that, at present, it can hardly be considered an efficient means of disposal for general adoption.

The fourth method of disposal (by salvage) aims at utilising the various constituents in the refuse, for the purpose they are best suited by reason of their inherent or intrinsic value. It has been found that by passing the refuse over mechanically operated screens about 70 to 75 per cent. of the total weight will pass through a 2 in. perforated screen and can be immediately eliminated. The 25 to 30 per cent. which passes over the end of the screen contains all the large waste paper, cardboard, tins, rags, bottles, etc., and can be fed on to a picking belt and all saleable material picked off by hand. The remainder can be burnt under a boiler and the steam used for driving the screens and plant.

The 70 per cent. is again passed over a $\frac{1}{2}$ in. screen to eliminate all the fine ashes and dust which is 20 to 25 per cent. of the bulk ; the remaining 40 to 50 per cent. contains most of the breeze and cinders. This can now be washed in a mechanical washer to get rid of the heavy incombustible debris (broken glass, crockery, clinker, etc.), and a good low grade fuel of uniform quality is obtained, suitable for use for steam-raising purposes. The fine ashes and dust can be ground to an even powder and sold as a fertiliser.

It may be urged that the success of a salvage plant depends upon obtaining a suitable market for the materials salved. This, to a certain

extent, is obviously true, particularly with material above the 2 in. size, but at the worst this can be burnt as suggested under a boiler. The fine ashes and dirt, if no market is obtainable as a fertiliser, need not be crushed, but can be dumped without fear of nuisance. It will, however, be readily granted that a low grade fuel is likely to obtain a ready sale for many years to come. One thing is clear: we can offer no excuse for the wholesale destruction of everything on the sole ground that it is waste or refuse, and until invention or science takes the present form of destructor another step forward, salvage presents many attractive possibilities as being a combination of the strong points of the first three mentioned systems.

Roads in relation to Health and Prosperity.

By. H. T. Chapman, M.Inst.C.E., County Surveyor of Kent.

JUST as a free circulation of the blood through our veins and arteries to all parts of the body is of vital necessity to health and life, so is a ready and easy passage of traffic to all parts of a country necessary for the well-being and prosperity of a nation.

The blood in its passage builds up and strengthens various members and limbs which otherwise would become numb and stagnate, and likewise traffic causes places and districts to develop and flourish.

The distribution and circulation of produce and manufactured articles at the lowest cost with celerity and ease is one of the greatest aids to prosperity, and it is of equal necessity that individuals should have similar facilities of travel both for business, health and pleasure.

Prior to the period between 1840 and 1850, or from 60 to 70 years ago, roads were the sole means of communication, and it is only within the past 20 years that self-propelled traffic has been in evidence to any great extent upon the roads.

Railways are dependent on the roads as feeders for their traffic, but during the past few years it has been demonstrated that, both for goods and passenger traffic, and particularly for moderate distances, road transport is again coming into favour.

It is unwise to forecast what will eventuate within the near future, but we have sufficient indication that our roads will become of much greater importance both for commercial and other services and that they must receive greater attention to render them adequate for even present necessities.

Owners of heavy and light motors, including steam-driven vehicles, who are now taxed for the upkeep and improvement of roads, rightly expect more consideration, but unfortunately, owing to unavoidably diminished work on roads during War years and the subsequent increased cost of all labour, materials, etc., reconstruction and improvement cannot progress in the same ratio as the use of the roads until more normal times.

The consequence is that, much as it is desirable and necessary to adopt more up-to-date methods than in the past, it is financially impossible to immediately reconstruct very large mileages of roads without unduly burdening the taxpayer and ratepayer.

It is therefore vitally essential that every possible saving and economy be exercised that will not necessitate consequent additional expenditure in reconstruction.

Generally speaking, with the exception of the neighbourhood of large cities and towns, the network of existing roads is sufficient for communications between the various places, and no very great mileage of new roads is required except for town planning, and in very populous areas.

The existing roads are, however, admittedly inadequate in alignment, width, strength and surfacing to meet present and future development of traffic and an enormous amount of work is required to effect the necessary alterations. These can only be carried out gradually, much as Surveyors would wish to deal with long sections of individual roads if funds were available.

The alignment or rather lack of the same is a legacy of our remote forefathers, who in making their tracks, avoided water, forests and other obstructions and preferred open country for safety, and these tracks have in most instances developed into the winding and tortuous roads now existing.

By constructing short diversions and rounding off turns, such roads may, however, be rendered sufficiently straight and safe for all practical requirements.

The cutting and trimming of hedges and trees, the lowering of fences which obstruct the view at turns and the prevention of the planting and erection of the same at and near bends and junctions would also greatly tend to the public safety.

It is also most necessary that Local Authorities and County Councils should have powers to prescribe building and frontage lines in order that the present disabilities may not be perpetuated. Unfortunately, in the smaller towns and villages, buildings and forecourts prevent necessary widenings being effected without heavy expenditure in the acquisition of properties and it may be that short bye-passes can be constructed less expensively than the widening of existing roads.

By reducing the camber where excessive, and strengthening the sides, carriageways can be altered so that a greater width is usable by vehicles and in many instances probably as much as 6 feet may be added without acquiring land beyond the present limits of the highways.

The carriageways of the rural and many urban main roads in Kent as in other counties do not average more than 18 feet in width, and this is admittedly insufficient; the writer is of opinion that 24 feet is not an excessive width for the volume of traffic now using the more important rural roads; a considerable mileage in the county is now being widened to that extent.

There are, however, very many miles of other roads throughout the country connecting villages and smaller towns with the through trunk roads used by motor bus services and char-a-banc traffic that are exceedingly narrow and cannot be widened without acquiring land and at great expense. The bus and other heavy motor traffic on these roads is of undoubted benefit to residents and tradespeople on the routes and in their vicinity, and also to visitors to our pleasure resorts, but it is not an unmixed blessing to other users of the highways or to the authorities responsible for the maintenance of the same.

The Ministry of Transport has powers to restrict the foregoing type of traffic on certain conditions, but we can appreciate that only under exceptional circumstances is it advisable to exercise such powers, which must of necessity penalise certain members of the community.

Owners and users of all vehicles will recognise that the chief lines of communication must receive first attention and other routes await their turn for widening, strengthening and improvement, and can only be maintained and kept in passable condition for the present. The Ministry of Transport have recognised this in their provisional Classification of the Roads now completed.

Many will recollect the time when motorists rendered life almost unbearable to other users of highways and adjoining residents, and also caused damage to crops and vegetation by dust; but out of this evil came good.

Highway Surveyors commenced tarring roads to minimise the dust, and it was soon ascertained that this treatment was not only a palliative but also increased the life of waterbound macadam by preventing disintegration and by waterproofing the surface.

The writer's predecessor in Kent, Sir Henry Maybury, who has done more than anyone in the construction, maintenance and improvement of the roads in this country, in addition to the enormous task he accomplished in France during the War, was one of the first to adopt surface tarring on

an extensive scale, and during his tenure of office in Kent, the roads of the county were second to none in the country.

With the increase of heavy motor traffic, it became evident that surface tarring of waterbound macadam would not suffice and the use of tarmacadam and other bituminous surfacings were extensively adopted.

Whatever type of surfacing is adopted, it is absolutely essential that adequate and compact foundations be provided, and this can be effected in many instances by utilising the material in the existing road crust (if of sufficient thickness), scarifying and screening the same and treating it with pitch, tar, or bitumen to form a basecoat for the subsequent surfacing or "carpeting" with a sand and bitumen mixture.

Granite sett paving on 9 inches of concrete or 6 inches of reinforced concrete may be desirable for roads carrying individually heavy loads, as from docks and in the vicinity of manufactories, and costs about 45s. per square yard, but possibly at this price may be economical having regard to its comparative life of 20 to 30 years. It is, however, noisy under steel tyred traffic and horses' shoes.

Soft wood creosoted block paving is perhaps the most pleasing surfacing for all types of traffic and populous neighbourhoods, but the cost to-day, including 9 inch concrete foundation or 6 inches reinforced, is towards 60s. per square yard. With the exception of the Metropolitan Boroughs and wealthier towns, it is at present a luxury that cannot be afforded. Its life may be 14 to 16 years and at pre-War prices and when money could be borrowed at low rates of interest, wood block paving was doubtless economical for heavy traffic.

The scavenging and cleansing of town roads and streets which is necessary for sanitary purposes will doubtless be considered by another section of the Conference, but it is essential that the surfaces should be impervious, smooth and even, so as to be readily cleansed and washed. At present much damage is caused to macadamised urban roads by excessive watering.

Heavy Motor Traffic in Relation to District Roads, by ARTHUR LILLEY, Assoc.M.Inst.C.E.I., Engineer and Surveyor, Cheriton U.D.C.

ABSTRACT.

THE subject of this paper has particular reference to heavy class traffic, which is daily becoming more and more localised in character, and by which roads of the town or urban type, laid down probably long before the introduction or development of such traffic, are in consequence seriously affected by excessive wear and tear. Not only those roads maintainable by the public are thus affected, but there may even be included private streets, respecting which difficulties are encountered by local authorities when applying road construction specifications suitable to the class of traffic referred to.

Further, the question of damage by reason of this modern type of traffic, and the unsuitability of roads, is not confined to the destruction of the road itself, but extends also to underground public services.

Reference is made in the paper to the Local Government (Emergency Provisions) Act, 1916—and the protection afforded Local Authorities in the case of opening up new routes for motor omnibus traffic, also the difficulties arising therefrom when determining whether routes have been " regularly used " for a certain specified period so as to be exempt from payment of contribution by omnibus owners as provided by Clause 20.

Main roads generally are now having to undergo entire reconstruction in order to cope with modern traffic requirements; so also are many of our more modern residential urban roads feeling the damaging effects of the same class of traffic. Nevertheless, it can hardly be expected of a local authority to take upon itself the burden of reconstruction of district roads that have sufficed and satisfactorily withstood the traffic for which they were designed, especially having in view the proposals of the Government in recently instituting a classification scheme for certain roads towards the improvement and upkeep of which there is every reason to suppose that assistance will be forthcoming. The question then presents itself of extending the classification of roads to include certain " third class " or district roads as to be eligible for national grants as in the case of other classified roads. Where it can be conclusively shown that district roads are daily carrying similar heavy class traffic, and perhaps in excess of other roads in the district already classified, that in itself should be sufficient claim for inclusion in a National Road Maintenance Scheme.

Illustrating the extent of heavy motor omnibus and other forms of heavy traffic on district roads, the writer's experience regarding certain water bound macadam roads in his district over which a census of heavy traffic was

taken last year, produced the following figures, which represent about 90 per cent. of the total traffic :—

	Motor Omnibuses and Charabancs. Weight in tons.	Traction Engines and Tractors. Weight in tons.	Total Weight in tons for 7 days.	Average daily weight in in tons.
Road No. 1. ...	3,444	213	3,657	522
Road No. 2 ...	2,864	456	3,320	474
Road No. 3 ...	694	213	807	115

These figures represent on road No. 1 approximately 24,000 tons per yard width of carriageway per annum ; on road No. 2, approximately 22,000 tons ; on road No. 3, approximately 5,000 tons.

A record of motor omnibus traffic only taken over the same period in respect of a private street showed no less than 463 tons average weight per day passing over the road, representing no less than 20,000 tons per yard width of carriageway per annum.

Investigations further as to damage to underground work showed that a 9 in. stoneware surface water sewer, constructed some 20 years ago, laid at a depth of 2 ft. 3 in., and running laterally under a wheel track in road No 2, was crushed in several places ; also 6 in. stoneware gully leads thereto were similarly damaged.

Failing classification of district roads of this nature, and the allotment of grants from the Government Exchequer, which would appear to be the proper source for financial assistance towards their maintenance and upkeep, the writer ventures to suggest a system of special local rating of all motor omnibus companies and traction engine owners.

The whole problem, however, has to be viewed, not only from the local authorities' point of view of reimbursement of cost of road charges, but from the point of view of general local conditions surrounding the whole question. The following points might be given consideration where questions of damage arise :—

1. The origin and purpose of the heavy traffic.
2. Whether of a temporary or permanent nature.
3. If permanent, does the district affected benefit in any way from its industry, that is :—
   (a) by the development and rating of any considerable amount of buildings, machinery, etc. ;
   or (b) by the employment of a number of persons resident in the particular district.

4. Whether the traffic or establishment is a nuisance or detriment to local property.
5. Whether further development in the locality is in any way prejudiced by the traffic or industry.

In conclusion, it is pointed out that traffic which to-day may be termed and proved to be "extraordinary" in character, will, no doubt, in time become, by usage and local conditions, ordinary traffic of the district; and Local Authorities, whilst giving every consideration to all points appertaining to the question, should act in such manner as would not in any way be prejudicial to the development and progress of their districts, probably dependent, to a very great extent, upon industries out of which this heavy class traffic arises. At the same time the ratepayer is entitled to protection against the increasing burden of highway charges.

Shortly after the reading of this paper before the Folkestone Congress in June last, it is to be observed that the Ministry of Transport announced that it would be prepared to give assistance to Local Authorities by the allotment of grants from the Road Fund to schemes of reconstruction and strengthening of important roads, also the surface tarring of roads not ranking as Class I. or II. It is to be hoped, therefore, that after initiating this course that the Ministry will eventually recognise the claims of certain of the unclassified roads of the town or urban type where the traffic, though localised, is of exceptionally heavy character.

The following took part in the discussion :—Dr. C. Porter (St. Marylebone) ; Prof. E. R. Matthews (London) ; Mr. S. E. Burgess (Middlesbrough) ; Mr. A. J. Martin (Westminster) ; Mr. E. G. Mawbey (Leicester) ; Mr. A. H. Elliott (Carlton) ; Mr. L. L. Baldwin (Coalville) ; Mr. G. W. Lacey (Oswestry) ; Mr. David Williams (Swansea) ; Mr. H. O. Jones (Folkestone) ; Mr. H. Sutcliffe (Todmorden) ; Mr. E. Willis (Chiswick) ; Mr. J. Gilbert (Wood Green) ; Mr. F. P. Dixon (Carlisle) ; Mr. H. P. Boulnois (London) ; Mr. C. Brownridge (Birkenhead) ; Mr. E. E. Finch (City of London) ; Capt. F. J. Cutting (Caversham) ; Mr. H. Morley Lawson (Deptford) ; Mr. Arthur Atkinson (Cheriton).

The general opinion on "Heavy Motor Traffic in relation to Roads" appeared to be adverse to that expressed in the paper, but the majority of those present were of opinion that all roads should be designed, constructed and maintained to carry all classes of modern traffic which might reasonably be anticipated to use the same.

Ship's Plumbing and Sanitation.

By J. L. Smyth, Asst. General Secretary United Operative Plumbers and Domestic Engineers' Association.

(Read at London Sessional Meeting, October 12th, 1921.)

THE provision of accommodation on ships comparable to accepted standards on land is perhaps impossible at present, and one can appreciate the splendid advances made in Marine Architecture in the face of enormous difficulties. Consideration of space is of paramount importance, and consequently we find, for instance, that under the Merchant Shipping Act, 1906, 120 cubic feet per man is the space provided for the crew, whilst 600 cubic feet per man is provided for soldiers in barracks, and in common lodging houses the allowance is 300 cubic feet.

Modern liners are comparable to towns of a fair size. Thousands of people are carried. The ship is, necessarily, self-contained, and, of course, plumbing and sanitary work is an important item. For instance, on the *S.S. Olympic* there are 600 wash-hand basins with direct water supplies and discharges, 150 baths, with direct hot and cold supplies, and discharges in most cases, and showers and douches. In addition there are Turkish baths and a swimming pond. There are 260 water closets. These few figures give a fair idea of the vastness of a modern liner, and the *Olympic* is not by any means our largest liner now. Having regard to lack of space alone, it will be conceded that the most sanitary methods should be adopted.

One would expect to find, therefore, that sanitary science had found its highest expression on ships, and that continual efforts were being made to overcome natural difficulties.

Unfortunately, such is not the case. On the contrary, sanitation does not appear to receive anything like the attention which it warrants as one of the principal items to be considered in the construction and upkeep of a ship.

We are rightly proud of our ability to build magnificent, speedy ships, but as we look at these triumphs of marine architecture and engineering, it is disturbing and humiliating to think that, hidden behind the beautiful exterior which embodies all that is best in ship construction, there is a crude state of affairs, It is the more humiliating when we know that such things are inexcusable, and are solely due to want of proper attention and supervision. Sanitary science can do justice to the most magnificent of our ships, as well as to our magnificent buildings.

Further points which present themselves, are as follows :—

(*a*) In the berths, cabinets are provided containing wash-hand basins. These cabinets, with their finely polished surfaces and beautiful mirrors are very nice to look at. When the wash-hand basins have been used, they are tipped up into a zinc hopper, which leads into a receptacle, which is emptied periodically by the stewards. The hopper cannot be properly got at for cleaning purposes, and in any case nobody worries about it, as it cannot be seen. The result is, of course, an accumulation of soapy substance, which is an ideal breeding ground for germs. Proper wash-hand basins with trapped wastes, could and should be provided. Very little, if any more, space need be occupied.

(*b*) Fresh water supply is a matter which calls for the strictest regulation to avoid possible contamination. In practice we find that filling pipes, for instance, are in some ships flush with the deck, so that when the screw cap which finishes the pipe is removed, anything in the way of dirt can get into the tanks as well as the water, which is being put in from the shore hydrant. It would be an easy matter to carry filling and sounding pipes to a convenient height up the ship's side, and fit them with screwed tops. Air pipes should have a goose neck terminal. Filtration is also a matter which requires the closest attention.

(*c*) Soil pipes are often fixed in warm places and near steam pipes, the result being incrustation and frequent stoppages. Examination doors are not used as they might be, and the pipes have, therefore, to be cut wherever they can be got at, in the dining saloon, the berth, the galley, the alleyways, etc. In spite of the admitted difficulties it is not beyond the ingenuity of naval architects to find suitable runs for these soil pipes on all classes of ships. The ventilation of soil pipes, although absolutely essential, is a point which is sadly neglected. It should not be a very difficult matter to arrange a vent system on any ship provided attention was given to the matter.

(*d*) The type of water closet fitting used is very often old-fashioned, dirty and inefficient. Old pan basins, hopper basins and troughs are in use, and there are no traps. There is really no reason why the most up-to-date water closet fittings should not be used, but, on the contrary, there are many sound reasons why the latest and best of everything in the sanitary line should be installed on ships.

(*e*) The supply of water to all sanitary appliances is often defective through want of head pressure, and the rusting up of pipes.

(*f*) Scuppers and other wastes are frequently connected direct to soil pipes. Even if wastes were trapped it is wrong to connect them with soil pipes, and such connections would not be allowed on land. On ships, connections of this sort are made without traps even. Faulty sanitary connections are not so easily seen, as they are very often made below the decks, in bunkers and holds. This fact in itself makes it imperative that there should be stringent regulations and strict supervision of sanitary work.

During 1920, 324 vessels, many of our crack liners amongst the number, arriving at the Port of Liverpool, had zymotic disease on board. We may assume that a similar state of affairs exists at all our large ports. Is it unreasonable to suggest that at least modern sanitary methods be adopted ?

The various Port Sanitary Authorities do their best, no doubt, but it is impossible for them to give close attention to plumbing and sanitary work, because of their multifarious other duties. In any case, there is not, so far as I am aware, anybody on the staff with the requisite practical and special knowledge required as regards sanitary plumbing. Therefore, unless there is an obvious nuisance at the moment of inspection, no fault is reported.

I would suggest that (*a*) the Board of Trade have powers similar to those possessed by the Local Government Board under the Public Health Act. (*b*) Regulations be made from time to time governing sanitary work according to latest methods. (*c*) Adequate provision be made for supervision and testing of all sanitary work by specially qualified men, with powers of condemnation where necessary. It would probably be desirable to appoint a Committee to go fully into the matter.

The British mercantile marine owes it to itself to preserve its prestige by proper attention to sanitation. Naval architects and shipowners owe it to the mercantile marine and the travelling public as well as to the crews.

Capt. Nicholson, Mercantile Marine Service Association ; Mr. B. I. Hellyer, Institute of Plumbers ; Mr. Goodall, Admiralty ; Mr. W. D. Caroe, Mr. Bew, Master Plumbers' Company ; Mr. Penrose, Plymouth ; Mr. Hugh Davis, City and Guilds Examination Board of Education ; Mr. Martlew, Mr. S. Sigworth, United Operative Plumbers and Domestic Engineers' Association ; took part in the discussion, which dealt mostly with defects noted on various passenger and merchant ships.

It was pointed out that the modern liner with its costly and complex installation warranted the best attention, and that the appointment of " Sea Going Plumbers " was very desirable. The " Sea Going Plumber " having the responsibility of the whole of the plumbing arrangements on

the ship should be a first-class man, thoroughly versed in all the possibilities of his craft so that he could properly deal with any emergency likely to arise.

The selection of these men is therefore a matter which ought to receive close attention, but at present this, unfortunately, is not the case, as there is no adequate or standard test imposed. In addition to this, Ship Owners, whilst recognising the necessity for a plumber, have not, generally speaking, given the plumber a proper status. The result is that the right type of plumber has no inducement held forth to take up " Sea Going " as a career, and even if a man with initiative and resource is selected, he is more or less stultified by the circumstances of his position. Every " Sea Going Plumber " should hold a certificate proving his theoretical and practical ability for the position.

Some interesting information was given as to the sanitary arrangements in ships of the British Navy, where the soil pipes are very carefully designed and arranged ; means provided by which they can be regularly flushed from the salt water service ; at each refit the soil pipes are removed, burnt out and re-galvanised before they are replaced. Soil pipes are ventilated by air escape pipes, led into the open air as high up as can be arranged. These also act as vents whereby the contents of the water closet pan are undisturbed by any change of pressure in the soil pipe due to the ship's motion.

The type of water closet adversely criticised in the paper is not fitted in the British Navy. Each pan has a connection to the vent pipe previously described ; while the pan has a trap of sorts, it is not a water seal, as experience has shown such a fitting to be a fruitful source of choking. Just above each pan, a small branch pipe is fitted connected to a trunk leading to an exhaust fan which discharges into the open air above the weather deck. Exhausts on a similar principle are provided to the urinals. The heads are thus kept free from objectionable smells.

A supply of water is arranged from a sanitary tank placed high up in the ship and also from the salt water fire service. Plumbers are included in the ship's company whose duty it is to see that these fittings are kept in good working order.

Soil pipes from water closets are never connected direct to ship's scuppers or any other outlets ; in fact an Admiralty Regulation provides that the discharges from *urinals* shall be entirely separate from the discharges from *W.C's.*, as experience has shown this to be desirable.

Automatic Filter.

For the Measurement of Suspended Impurity in the Air.

THE automatic filter, invented by Dr. J. S. Owens, for the measurement of suspended impurity in the air, is essentially an automatic aspirator by means of which, at regular intervals of time, the length of which can be varied at will, a fixed volume of air is drawn through a filtering paper of sufficiently fine texture to collect on its surface the whole of the dirt in the air, leaving it in the form of a discoloured patch which can be interpreted later. This is combined with an arrangement for moving the paper after each record is taken, thus bringing a fresh filtering area into position for the next record, and also registering the time of each.

The filter, which is supported on an iron tripod at a height of some four feet from the ground, consists of a copper containing vessel of about three litres capacity, connected at the bottom to a low pressure water supply through a small sliding valve, the function of which is explained later. The water supply tube is provided also with a regulating cock, by means of which the supply of water is adjusted as required.

Down the centre of the main vessel is a vertical copper rod capable of small movement up and down, the lower end of which actuates the sliding valve in the inlet tube, the upper end passing outside the vessel through a flexible leather diaphragm, similar to those used in dry gas meters, so that although the rod is capable of movement in a vertical direction, there can be no leakage of air where it passes through the top of the vessel.

Attached to the rod immediately below the diaphragm, there is a brass disc of slightly smaller diameter than the leather, converting the diaphragm virtually into an air tight piston, the purpose of which is described below.

The top of the rod is connected to a horizontal arm, supported on a pivot over the edge of the vessel, and fitted with an adjustable balance weight or counterpoise, so that normally the end of the arm carrying the central rod is kept lifted. This keeps open the sliding valve at the bottom, so that water is free to enter the vessel.

Fixed on to the rod about a third of the way down from the diaphragm is a copper cylindrical bell, open at the bottom, and closed at the top except for a circular hole $\frac{1}{2}$ in. in diameter on which is supported a spherical glass float, with a thin stem projecting through into the bell, where it is supported in such a way as to be capable of limited movement vertically, without being able to fall out of place if the instrument were tipped.

Fixed to the horizontal arm, between the pivot and central rod, there is a hollow plug with tapered end, sliding in a vertical sleeve, so that

when the rod is pulled down, the plug is depressed over an orifice leading to the interior of the main vessel, the orifice being of the same diameter as the hole down the centre of the plug. Between the orifice and the bottom of the plug the filter paper moves so that when the plug is depressed, a small disc of paper is isolated, when the only means of access of the air to the interior of the vessel is through this isolated patch of paper.

The paper is in the form of a disc, seven inches in diameter, divided similarly to a clock face into 24 hourly divisions, each numbered, and is supported on a brass turntable fitted on a pivot in such a position that a point near the circumference of the disc is always under the plug. The turntable is rotated by means of a weight and string passing over a pulley and wrapped round a drum below the paper, the position being regulated by means of a stop resting against the hand of a clock above the paper. In this way the disc turns so that the point under the plug, expressed according to the figure printed on the paper, corresponds to the time of the day. The reason why the weight is required to rotate the disc is that while each record is being taken, the disc is held fast, and so if it were connected rigidly to the hand of the clock, the clock would be stopped. As it is, the hand continues to move when the disc is held, but as soon as the paper is released, it catches up to the clock by virtue of the weight and string. Then the time at which each record is begun is indicated by its position on the disc.

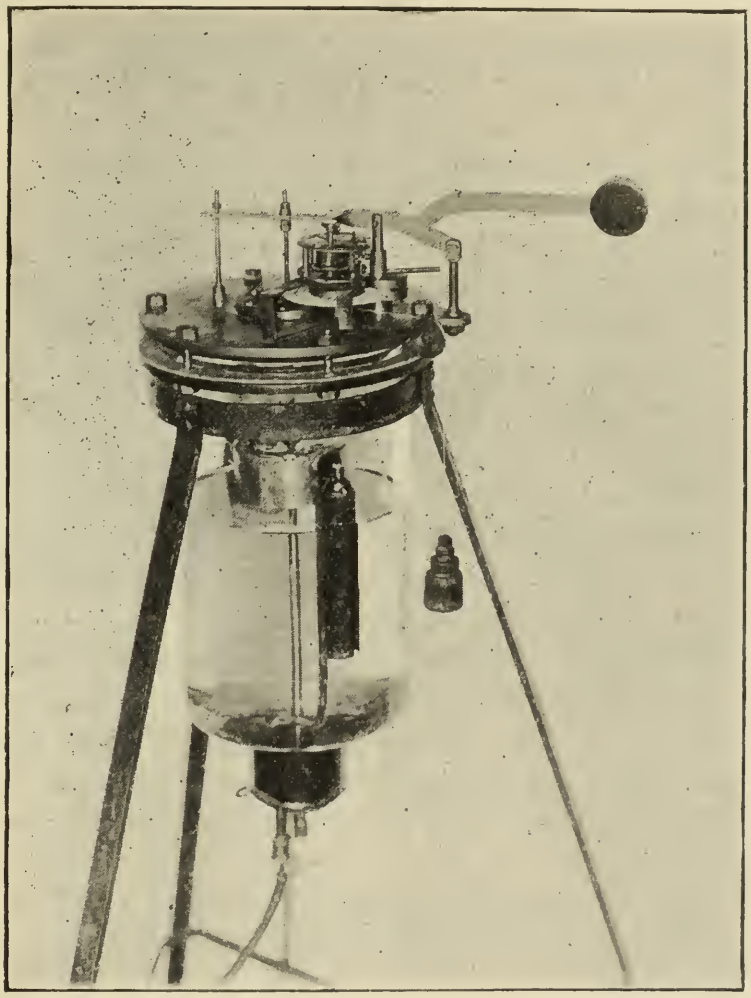
A syphon tube, with one leg larger than the other, which particular design was found to be necessary to ensure reliable action at the right time, and freedom from trickling over the bend without filling the tube, is fitted inside the main vessel, the outlet tube passing through the bottom to the ground. A gauge to show the position of the water level at any time is fitted to the vessel.

The mode of operation of the filter is as follows :—The central rod and plug are lifted by means of the balance weight on the arm, so that the paper disc is free to rotate with the clock hand, and the sliding valve in the inlet tube is open. Water enters the main vessel, and as its level rises the displaced air passes freely out through the orifice in the top, under the paper. As the bell on the central rod becomes submerged, the glass float is lifted out of position, and as the air contained can escape, the bell becomes entirely filled with water.

As soon as this has taken place the syphon comes into operation, the water level having reached the bend of the syphon tube, the water flows rapidly from the vessel, overtaking the inflow, thus causing the level inside the vessel to fall.

The glass float is lowered on to the hole in the bell, when the surface tension of the water is sufficient to seal it quite air-tight.

Thus, virtually the hole does not exist, and consequently the water cannot run out of the bell. As the level outside falls, the bell, still full of water, acts as a steadily increasing weight until at a definite point it overbalances the counterpoise on the arm and pulls down the rod. This shuts off the water supply by means of a sliding valve and simultaneously depresses the plug on to the filtering paper, so that the air entering the vessel must now pass through the isolated patch of paper.



The resistance offered by the paper to the passage of air is considerable, and consequently by virtue of the long tube fitted to the syphon the pressure inside the vessel very rapidly becomes reduced below atmospheric by a head of water almost, but not quite, equal to the vertical length of the outlet tube, that is about three feet. This reduction in pressure is sufficient to cause air to be drawn through the paper, and it also serves another purpose. The difference of pressure between outside and inside the vessel, acting on the supported diaphragm, causes the central rod to be very firmly held down and through the medium of the pivoted lever, this presses the

hollow plug on to the filter paper with a force of about 6 lbs. weight. The actual surface bearing on the paper is small, and in consequence the pressure between the paper and metal is as great as 180 lbs. per square inch, which is sufficient to form an air-tight joint round the edge of the isolated filtering patch.

When the level of the water falls to the lower edge of the bell, air enters the bell, which empties itself of water and no longer acts as a weight. But this is of no consequence, the rod being now held down as above explained.

Syphoning continues until a level near the bottom of the vessel is reached, when the syphon " breaks," no more water runs out, and the pressure inside the vessel slowly returns to atmospheric. When the difference inside and outside no longer exerts sufficient force on the diaphragm the central rod and plug are raised by the balance weight opening the valve, again admitting water to the vessel and releasing the paper disc. This is turned by means of the weight and string until the stop again catches up and rests against the hand of the clock, which meanwhile has been progressing steadily while the paper has been held by the plug. The time taken for the pressure to rise by the required amount, after the " breaking " of the syphon, would be inconveniently long but for a slight leakage of water past the valve at the bottom, deliberately allowed, which, although not interfering in any way with the working of the instrument, helps to restore pressure in the vessel when filtration of air through the paper has become very slow, just before the raising of the rod and plug.

The length of the inner limb of the syphon is adjusted so that the capacity of the vessel between the two water levels at which the bell pulls down the rod at the beginning of the record, and the balance weight raises it at the end, that is, the volume of air drawn through the paper at each operation is exactly 2 litres at atmospheric pressure, which volume has been found quite convenient.

The size of the circular patch of paper isolated for actual filtering may be varied according to the sensitiveness required, but for general purposes it is $\frac{1}{8}$ in. in diameter.

Each record is interpreted by comparing the blackness with a standard scale of shades which has been calibrated by comparison with larger paper filter records, the deposit on which had been actually weighed. The scale of shades consists of squares numbered 1 to 20, of even gradation of shade from white to nearly black. The matching presents little difficulty and results can be expressed in absolute units, each shade having been found to represent 0.32 mgs. of dirt per cubic metre, which is equivalent to 0.54 lbs. per million cubic yards.

The only attention the instrument requires is the changing of the paper disc once every twenty-four hours, and the daily winding of the clock.

THE ROYAL SANITARY INSTITUTE.

FOUNDED 1876.

REVIEWS OF BOOKS.

CHEMICAL DISINFECTION AND STERILIZATION.*

This work collects and collates the various problems and more important applications of general methods in disinfection and sterilization, and is a clear and valuable summary of the hitherto scattered information on this subject. A full and useful bibliography is appended to each chapter, and a subject and author index add to the convenience and utility of the book.

On the question of air disinfection the authors commence with the statement, that although in the early days it was considered necessary to disinfect the air, it is now generally realised that air-borne infection is extremely rare, and conclude with the comment of Vallin that "Disinfection of air is useless and gives a deceitful security."

A chapter is devoted to Public Disinfection, it being pointed out that fresh air, light, and frequent cleansing are the essentials to be aimed at.

The disinfection of rooms and vehicles, sick rooms, fomites, hospitals and slaughterhouses are dealt with.

Under the heading of Sick Rooms (ii.) Clothing, p. 95, the authors state that the washing must never be done, nor the clothes hung out to dry, on the same day as the ordinary house washing, nor should they be ironed or starched in the same room or with the same utensils. It is difficult to understand why and we would have liked some elucidation of this point.

Several chapters are devoted to the chemicals employed in disinfection, chemical constitution and germicidal activity are considered in detail and some interesting deductions are drawn. In the emulsified disinfectants the protective action of the emulsion is enhanced if the emulsion contains parasitotropic groupings. Although gelatine itself has but a feeble protective action, the incorporation in the gelatine or the conversion of part of the gelatine molecule into a parasitotropic grouping which reacts with either a protein or cellulose constituent of the organism enhances the protective action, but the protective action is really an enemy in disguise for the protector then kills the organism.

* CHEMICAL DISINFECTION AND STERILIZATION, by Samuel Rideal, D.Sc., and Erik K. Rideal, D.Sc., M.A. 8vo., 313 pp. London, 1921. Edward Arnold & Co. Price 21s.

Inorganic substances—non-metallic and metallic derivatives, organic substances—aliphatic derivatives and aromatic derivatives and the organo metallic derivatives are all duly and scientifically considered, and the results of different observers set forth.

The mechanism of disinfection is relatively complicated, and is not a simple chemical process. Diffusion and osmosis as well as phenomena such as reversible and irreversible chemical coagulation play an important part in the operation.

By thus consolidating our present knowledge of the subject of disinfection the authors of this book have done much to smooth the paths of explorers in this intricate branch of Science.

G. F. B.

Manson's Tropical Diseases.*

The seventh edition of this excellent work, which first appeared in 1898, has now been published. Since publication of the Sixth Edition in 1917 much new material has become available, partly owing to general advance in knowledge attributable to experiences gained during the war, partly to scientific work on new subjects, and partly owing to expansion of knowledge on the subject of tropical fevers. Considerable parts of the book have been re-arranged and re-written. There are very useful appendices on Medical Protozoology, on Medical Helminthology, Entomology, etc., and on Laboratory methods as applied to clinical medicine in the tropics. The book is copiously and extremely well illustrated; in every way it reflects great credit on the Editor and those who assisted him in the work. We regret to see the expression "ptomaine poisoning" used on page 472 in connection with the differential diagnosis of bacillary and amœbic dysentery; "acute food poisoning of bacterial origin" is no doubt intended, but this form of poisoning has nothing to do with ptomaines, as W.G. Savage and others have frequently pointed out.

The Editor might perhaps have mentioned, in dealing with plague, that cats and ferrets are susceptible animals, and, from their habits, are liable to become infected when plague has occurred among local rodents.

J. S. L.

The Stages of Human Life.†

This book is of interest to the Hygienist as it deals with the question of personal hygiene. It is not particularly instructive in the medical sense. It contains many quotations from Philosophers and Poets while a religious spirit pervades the whole work, but the book, on the whole, makes interesting reading and should be found helpful to parents, Health Visitors, Nurses, Welfare Workers, and everyone interested in Health matters.

G. F. B.

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* Manson's Tropical Diseases, Edited by Philip H. Manson-Bahr, D.S.O., M.A., M.D., M.R.C.P., seventh edition. 8vo., 960 pp. illustrated. London, 1921. Price 31s. 6d.

† The Stages of Human Life, by J. Lionel Tayler, M.R.C.S., etc. 8vo., 377 pp. London, 1921. John Murray. Price 18s.

Hygiene for Health Visitors, School Nurses and Social Workers.*

The first edition of this work which was published in 1912 was favourably reviewed in this Journal at that time. This, the second edition, the issue of which has been delayed on account of the author's absence abroad and pressure of other work, creates an impression and deserves a reception no less favourable. The matter has been completely revised and a considerable number of additions have been made. That the work of revision has been well and carefully done goes without saying, and that the volume will retain its place in the list of the books health visitors in training like to read is equally certain.

C. P.

Mother and Child.†

The fourth edition of this book is now issued and is brought up-to-date. In his introduction the Author says : the book is designed to help the physician in the care of his patients, by placing at their disposal information which physicians commonly give to their patients. Though it is written primarily for those living under the conditions present in the United States, there is much in it useful to all English speaking people, though it is not likely to displace, in this country, well-known manuals, dealing with the same subjects.

A. B. H.

* Hygiene for Health Visitors, School Nurses and Social Workers, by C. W. Hutt, M.A., M.D., D.P.H. 8vo., 382 pp., illustrated. London, 1921. Methuen & Co., Ltd. Price 12s. 6d.

† Mother and Child, by Edward P. Davis, A.M., M.D., fourth edition. 8vo., 278 pp., illustrated. Philadelphia, 1921.

MEETINGS HELD.

The Henry Saxon Snell Prize.

THE subject given for the Essays in competition for this Prize was "Suggestions for a System of Central Hot Water Supply and Heating, adapted to Modern Housing Schemes, and to existing groups of Houses." Thirteen Essays were sent in and they have been brought under the consideration of the Council.

The adjudicators for the Competition were :—

MR. EDWIN T. HALL, F.R.I.B.A.
PROF. J. RADCLIFFE, M.Sc.(Tech.).
MR. H. D. SEARLES-WOOD, F.R.I.B.A.
MR. A. SAXON SNELL, F.R.I.B.A.
SIR HENRY TANNER, C.B., I.S.O., F.R.I.B.A.
MR. J. A. MACINTYRE, O.B.E., B.Sc., M.Inst.C.E., nominated by H.M. Office of Works.
PROF. A. H. BARKER, B.A., B.Sc., nominated by the Institution of Heating and Ventilating Engineers.

The adjudicators reported that they desired to commend the writers of the Essays under the mottoes of "Forward," "Fuel Economy" and "Efficiency" for the care with which their Essays have been prepared, but they did not consider that any of the Essays sent in were of sufficient merit to receive the Prize offered.

The Council have, therefore, decided to withhold the award on this occasion.

An announcement of the next offer of the Prize will be made at an early date.

EXAMINATIONS.

Since the last issue the following examinations have been reported :—

Liverpool, October 21st and 22nd.
Newcastle, October 28th and 29th.
Manchester, November 18th and 19th.
London, December 9th and 10th.

For Inspectors of Meat and other Foods.

Newcastle, November 11th and 12th.
Liverpool, November 25th and 26th.
London, December 16th and 17th.

At these examinations 362 candidates presented themselves, and the following were awarded certificates :—

Sanitary Science as applied to Buildings and Public Works.

COPPOCK, VINCENT, *London.*
HANIF, M., *Clapham.*
KESVAN, MEIYUR, *Brixton.*
PARRY, WILLIAM WALTER, *Gwespyr.*
SHARP, WILLIAM HODGSON, *Tooting.*
SHEPHERD, GEORGE VALENTINE, *Newport.*
STITSON, JOHN WILLIAM, *London.*
WASS, ARNOLD CROWTHER, *Grimsby.*

Maternity and Child Welfare Workers.

DWYER, CATHERINE, *Blackburn.*
LEACH, AGNES ISABEL, *Gillingham.*
MORRIS, HELEN LOUISE, *Ely.*
SIME, EFFIE FLEMING, *Kirkoswald.*
SMYTH, MARGARET JANE, *Bristol.*

Women Health Visitors and School Nurses.

BACKHOUSE, SARAH ANNIE, *Holborn.*
BIDMEAD, VIOLET ELSIE, *Victoria.*
BINDLOSS, CHARLOTTE MARY, *Hampstead.*
BULL, FRANCES HILDA, *Clapton.*
CAWLEY, MARGARET, *Wimbledon.*
CHAPMAN, ALICE MAUD, *W. Hartlepool.*
CLARK, FRANCES MARY, *Tunbridge Wells.*
CORNOCK, MARGARET MARY, *Woking.*
COULSON, MARY, *Walker-on-Tyne.*
DAVIES, GWEN, *Llandudno.*
DRUCE, ISABEL BESSIE MAY, *London.*
DRUMMOND, WILHELMINA, *Regent's Park.*
FORREST, NORA EVELYN, *Wallsend.*
FOSTER, ELIZABETH HANNAH, *Sunderland.*
FREER, EVELYN ELIZABETH, *Leamington Spa.*
GREEN, RUTH, *Tynemouth.*
HILLIARD, MARGARET AGNES, *Wimbledon.*
HOARE, KATHLEEN MILDRED, *Hastings.*
HOPPER, MAISIE LINDSAY, *Dunston.*
HUTCHINSON, HETTIE ELIZABETH, *Bishop Auckland.*
HUNTING, MARY AGNES, *Bloomsbury.*
JENKINS, AMELIA CHARLOTTE, *London.*
KENNETT, JESSIE, *Havant.*
LAVER, ALICE, *Surbiton.*
LEPPER, AMY, *Woburn Sands.*
MORGAN, MARGARET, *Halesowen*
PIKE, MARY BLYTH, *Edinburgh.*
ROBERTS, ANNIE, *Tooting.*
SAPSFORD, MAY ELIZABETH, *Clapham.*
SAYER, FANNY, *Dorking.*
SECCOMBE, WINIFRED ROSE, *London.*
SMITH, LOUISE, *Barking.*
SOMERFORD, EDITH HILDA, *Clapham.*
STEVENSON, JOYCE ELAINE, *London.*
STOUT, MARJORIE JOAN, *London.*
THORP, MABEL, *Greenwich.*
TROBE, CATHERINE, *Bellingham.*
VENNER, ROBERTA ELIZABETH, *London.*
WALKER, CATHERINE, *Woolwich.*
WALTERS, MABEL ALICE, *Ashford.*
WEST, LILIAN, *Clapham.*
WIDDOWS, DOROTHY ANN, *Chorley.*
WILDERSPIN, GERTRUDE, *Forest Gate.*
WILLIAMS, EMILY EDITH, *London.*

School Hygiene, including Elementary Physiology.

Bailey, Vera Doris, *Liverpool.*
Branscombe, Gwenyth Mary, *Bedford.*
Clarke, Mabel, *Liverpool.*
Cooper, Winifred Lilian, *London.*
Crompton, Alice Worsley, *Liverpool.*
Crossley, Elizabeth Maude, *Liverpool.*
Dearle, Gwendoline Miriam, *Liverpool.*
Dickinson, Dorothy, *Liverpool.*
Diggle, Edith, *Liverpool.*
Dobson, Cecilia Elizabeth, *Liverpool.*
Dodds, Barbara, *Liverpool.*
Edghill, Joan, *Altrincham.*
Elliot, Clara Lucy, *Bedford.*
Forrester, Mary Elizabeth, *Liverpool.*
Graham, Ethel Frances, *Liverpool.*
Hoffa, Sylvia Crosby, *Liverpool.*
Jacob, Hilda, *Liverpool.*
Lennard, Ellen Armstrong, *Bishop Auckland.*
McCurry, Lucy Margaret, *Liverpool.*
Metcalf, Primrose, *Liverpool.*
North, Ruby Kathleen, *Bedford.*
Palin, Rhoda Vera, *Liverpool.*
Parkinson, Joan Frances Hannah, *Liverpool.*
Rayden, Beatrice, *Sunderland.*
Reid, Elizabeth, *Liverpool.*
Ruscoe, Kathleen Mary, *Liverpool.*
Salmon, Winifred Mary, *London.*
Sparrow, Mabel Caroline, *Liverpool.*
Tod, Marjorie Bruce, *Liverpool.*
Yale, Lilian Isabella Louise, *Liverpool.*
Young, Elizabeth Grainger, *Liverpool.*

Inspectors of Nuisances.

Black, John, *Hebburn-on-Tyne.*
Bonnett, James Ebsworth, *Ashwell.*
Bromley, John William, *Chatham.*
Brown, Ada, *Whalley Range.*
Burr, Cecil John, *Woolwich.*
Bent-Ward, May Hester, *Reading.*
Carr, Edwin, *Brighton.*
Clark, Elleanor, *Gateshead.*
Clarkson, Ernest Hodgson, *Horbury.*
Cockburn, William, *Newcastle.*
Crowder, William Platt, *Sheffield.*
Dawes, Herbert Donald, *Brockley.*
Doust, Reginald, *Gravesend.*
Edmonds, Ronald Walter Quaife, *Rochester.*
Ellis, William Thomas, *Penmaenmawr.*
Ford, Albert Edward, *Epsom.*
Griffiths, Edgar Dennis, *Wrexham.*
Grutchfield, Reginald Walter, *Brighton.*
Harding, Alice, *Stokenchurch.*
Harker, Margaret, *Sheffield.*
Hawthorne, George Stanley, *Reading.*
Hewertson, Sarah Agnes, *Whalley Range.*
Holt, Arthur Howard, *Bury.*
Hooper, James Thomas, *Kingston.*
Hughes, Archibald John, *Woodford.*
Hughes, Norman John, *Shanghai.*
Jack, James, *London.*
Jackson, Stanley Mellor, *Shipley.*
Jameson, Charles Frederick, *Newcastle.*
Jones, John Griffith, *Liverpool.*
Kempton, Arthur Richard, *S. Norwood.*
Kilbey, Margaret Louise, *London.*
Knight, Frederick, *Rusholme.*

Landale, William George, *Whitley Bay.*
Lapham, Robert Mervyn, *Warminster.*
Lucas, Douglas, *Sheffield.*
Male, Arthur, *London.*
Marshall, Louie Rebecca, *Hounslow.*
Martin, Ernest Henry, *Hackney.*
Milward, May, *Rotherham.*
Miller, William Norman, *Southborough.*
Mills, Robert Clyde, *W. Ealing.*
Mineard, Arthur George, *Uxbridge.*
Moore, John, *Southport.*
Morton, Charles Leonard, *Blackpool.*
Page, William John, *Leeds.*
Park, Norman, *Newcastle.*
Parker, Herbert, *Blackpool.*
Phillipson, Roland Burton, *Dublin.*
Pickering, Tom, *Blackburn.*
Poxon, Mary, *Kensington.*
Pursall, Clifford Henry, *Blackpool.*
Richardson, Charles Herbert, *Weedon.*
Richardson, Ernest, *Wigan.*
Rodley, George, *Clay Cross.*
Sargent, Leo Victor, *Chatham.*
Smith, William, *South Shields.*
Spooner, Lillian, *Twickenham.*
Steele, Ernest, *London.*
Stevenson, Edith A., *Edgbaston.*
Strathmore, John H. W. Dalziel, *Camberwell.*
Taunton, Arthur Lemuel, *Stoke Newington.*
Tomkins, George Edward, *Hove.*
Willimott, Walter Thomas, *New Ferry.*

Inspectors of Meats and other Foods.

Baskett, Reginald Arthur, *E. Ham.*
Burrell, Leslie Walter, *Shepherd's Bush.*
Carter, Louis Alfred Latimer, *D.S.O., Capt., R.A.S.C.*
Crossby, William Ernest, *M.C., Capt., R.A.S.C., London.*
Dixon, Joshua Gilholm, *Wallsend-on-Tyne.*
Grabham, Charles Augustus, *Isleworth.*
Greenwood, Robert, *Doncaster.*
Henson, Hugh Arnold, *Capt., R.A.S.C.*
Howarth, Christopher Yates, *Liverpool.*
Kirby, John, *Stockton-on-Tees.*
McClelland, Geoffrey, *Coventry.*
Martin, Charles Robert Arthur, *High Wycombe.*
Moore, Herbert, *Clapham.*
Reeves, Reginald Alfred, *Reading.*
Richards, Henry George, *Buckhurst Hill.*
Robinson, Lewis George, *Capt., R.A.S.C., London.*
Smith, Arthur Russell, *M.C., Capt., R.A.S.C., Stroud.*
Stanley, James, *North Shields.*
Sutcliffe, Denis, *Slaithwaite.*
Thomas, Daniel, *Wrexham.*
Veitch, Taylor Park, *Chopwell.*
Walker, Granville, *Leytonstone.*
Wright, Godfrey Tarbet, *Capt., R.A.S.C., Tidworth.*

FORTHCOMING MEETINGS.

Lectures.

The Introductory Lecture to the Spring Courses of Lectures will be delivered by Prof. H. R. Kenwood, C.M.G., M.B., D.P.H., F.R.S.E., on January 30th, at 5.30 p.m.

The Course for Sanitary Officers will commence on February 1st; for Health Visitors and Child Welfare Workers on February 3rd; and for Meat and Food Inspectors on February 10th.

Sessional Meetings.

London.—Tuesday, February 14th, at 5.30 p.m. Discussion on "The Administrative Measures necessary in regard to the Slaughtering of Animals and the Storage and Transport of Meat in connection with the Report issued by the Ministry of Health," to be opened by W. M. Willoughby, M.D., D.P.H., M.O.H., Port of London; J. Edwards, Member of the Departmental Committee; J. R. Dixon, M.R.C.V.S., Veterinary Inspector, Leeds.

Norwich.—Friday, February 17th, at 6 p.m. Discussions on "The Carrier Problem in Disease," to be opened by S. L. Leggat, O.B.E., M.B., D.P.H., Assistant Medical Officer of Health; and on "The Norwich Flood, 1912," by Henry Wood, A.M.Inst.C.E., Deputy City Engineer.

The Chair will be taken by Louis C. Parkes, M.D., D.P.H. Hon. Local Secretary, H. Cooper Pattin, M.D., D.P.H., Medical Officer of Health.

On Saturday, February 18th, visits will be made to Isolation Hospital, Waterworks, new bridges and road over river and railway, or Gas Works.

Leeds.—Friday, February 24th, at 7 p.m. Discussions on "The Limitations of Bacteriology in connection with Public Health Work," to be opened by J. W. McLeod, M.B., Lecturer in Bacteriology, University of Leeds; and "Hospital Management and Treatment of Infectious Diseases," by A. E. Pearson, L.R.C.P., M.R.C.S., Medical Superintendent, Seacroft Infectious Diseases Hospital.

The Chair will be taken by Prof. H. R. Kenwood, C.M.G., M.B., Chairman of Council. Hon. Local Secretary, J. Johnstone Jervis, M.D., D.P.H., Medical Officer of Health.

On Saturday, February 25th, visits will be made to the Farnley Iron Works, the English and Continental Casing Company's Works, and the Seacroft Fever Hospital.

London.—Tuesday, March 14th, at 5.30 p.m. Discussion on "Central Heating in relation to Domestic and other Dwellings," to be opened by Prof. A. H. Barker, B.A., B.Sc.

The Chair will be taken by Sir Henry Tanner, C.B., I.S.O., F.R.I.B.A.

Blackburn.—Friday, March 17th, at 6 p.m. Discussions on "The Sanitation of Places of Entertainment," to be opened by W. Allen Daley, M.D., D.P.H., Medical Officer of Health, Blackburn; and "Conversion of Pail Closets," by A. T. Gooseman, M.Inst.C.E., Borough Engineer.

The Chair will be taken by Prof. H. R. Kenwood, C.M.G., M.B., D.P.H., Chairman of Council. Hon. Local Secretary, W. Allen Daley, M.D., M.O.H.

On Saturday, March 18th, visits will be made to Messrs. Whitaker's Sanitary Ware Works, the Corporation Sewage Works, Hospital, and Refuse Destructor, to newly erected houses and houses in course of erection, Picturedromes, the new Public Halls, including the Ozonair system of ventilation, Tuberculosis Dispensary, Maternity Hospital, conversions in progress, and to a Cotton Mill.

London.—Tuesday, April 11th, at 5.30 p.m. Discussion on "Economy in Sanitary Appliances and Methods of Drainage."

Ordinary General Meeting.

The Ordinary General Meeting will be held at the Institute on Wednesday, April 26th, at 4.30 p.m.

CONGRESS.

At the invitation of the Mayor and Corporation, it has been arranged to hold the 33rd Congress and Exhibition of the Institute at Bournemouth from July 24th to 29th, 1922. A Public Meeting to inaugurate the organisation of the local arrangements will be held in the Town Hall on Thursday, January 12th, at 3 p.m., to which Members and Associates are invited.

Major-General the Right Hon. J. E. B. Seely, C.B., C.M.G., P.C., D.S.O., M.P., has consented to act as President of the Congress.

The invitation to appoint Delegates to the Congress has been issued to all Health Authorities in the United Kingdom, to Dominion, Colonial and Foreign Governments, and to the principal towns in the Dominions and Colonies of the Empire.

Members are asked to help in making the Congress known, and in securing the appointment of Delegates to the meeting.

Examinations.

In Sanitary Science as applied to Buildings and Public Works, for Inspectors of Nuisances, Maternity and Child Welfare Workers, Women Health Visitors and School Nurses, and School Hygiene, including Elementary Physiology, will be held at :—

Hereford, January 20th and 21st.	Norwich, March 3rd and 4th.
Plymouth, February 3rd and 4th.	Portsmouth, March 17th and 18th.
Preston, February 17th and 18th.	Edinburgh, March 24th and 25th.

For Inspectors of Meat and other Foods :—

Manchester, February 24th and 25th.

Calendar for January to April.

As far as at present arranged.

JANUARY.

12 Th. Public Meeting, Town Hall, Bournemouth, at 3 p.m. To inaugurate arrangements for Bournemouth Congress.

20. F. } Examinations, Hereford.
21. S. }

30 M. Introductory Lecture to Students attending the Spring Courses, at 5.30 p.m., by Prof. H. R. Kenwood, C.M.G., M.B., D.P.H., F.R.S.E.

FEBRUARY.

1 W. Lecture to Sanitary Officers, at 6 p.m. Public Health Acts—English, Scotch, Irish ; other Statutes relating to Public Health, by Charles Porter, M.D., B.SC., M.O.H., St. Marylebone.

3 F. Lecture to Sanitary Officers, at 6 p.m. Public Health (London) Acts, etc., by Charles Porter, M.D., B.SC.

3 F Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Personal Hygiene, Importance of Cleanliness, by J. A. H. Brincker, B.A, M.D., D.P.H.

3 F
4 S } Examinations, Plymouth

6 M Lecture to Sanitary Officers, at 6 p.m. Factory and Workshop Acts, Smoke Legislation, Food and Drugs Act, 1899, by Charles Porter, M.D., B.SC.

6 M Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. The Growth and Development of the Child, by J. A. H. Brincker, B.A., M.D., D.P.H.

8 W Lecture to Sanitary Officers, at 6 p.m. Duties of a Sanitary Inspector General, A. Outdoors, by Charles Porter, M.D., B.SC.

8 W Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Hygiene of the Special Senses, by Mrs. Margaret C. M. Hogarth, M.B., CH.B.

9 Th Demonstration to Sanitary Officers, at the Public Health Offices, 10, Compton Terrace, Upper Street, Islington, N., at 6 p.m. Book-keeping as carried out in a Sanitary Inspector's Office, by James R. Leggatt, Superintendent, Public Health Department.

10 F. Lecture to Sanitary Officers, at 6 p.m. Duties of a Sanitary Inspector. General, B, Indoor, by Charles Porter, M.D., B.SC.

10 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Physical Development, by Mrs. Margaret C. M. Hogarth, M.B., CH.B.

10 F. Lecture to Meat Inspectors, at the Institute, at 6 p.m., by J. R. Hayhurst, M.R.C.S., D.V.S.M. (Vict.), Superintendent, Metropolitan Cattle Market.

13 M. Demonstration to Sanitary Officers on Meteorological Instruments in the Parkes Museum, at 5.30 p.m., by the Director, E. White Wallis, F.S.S.

13 M. Lecture to Sanitary Officers, at 6 p.m. Duties of a Sanitary Inspector—C : Offensive Trades and Trade Nuisances, etc., by Charles Porter, M.D., B.SC.

13 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Physical Conditions affecting Health in Schools, by Mrs. Margaret C. M. Hogarth, M.B.

14 Tu. **Sessional Meeting, London,** at the Institute, at 5.30 p.m. Discussion on "The Administrative Measures necessary in regard to the Slaughtering of Animals and the Storage and Transport of Meat in connection with the Report issued by the Ministry of Health."

15 W. Inspection and Demonstration at L.C.C. Municipal Lodging House, Kemble Street, Drury Lane, W.C., at 2.30 p.m.

15 W. Lecture to Sanitary Officers, at 6 p.m. Elementary Science : Physics, Chemistry, by Alan E. Munby, M.A., F.R.I.B.A.

15 W. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Home Economics and Cookery, by Mrs. K. Lomax-Earp.

17 F. Lecture to Sanitary Officers, at 6 p.m. Elementary Science : Physics, Chemistry, by Alan E. Munby, M.A., F.R.I.B.A.

17 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Duties and Powers of Health Visitors, by G. F. Buchan, M.D., D.P.H., M.O.H., Willesden.

17 F. Lecture to Meat Inspectors at the Institute, at 6 p.m., by J. R. Hayhurst, M.R.C.V.S.

17 F. } **Sessional Meeting, Norwich,** in the Guildhall, at 6 p.m. Discussions on
18 S. } "The Carrier Problem in Disease" and "The Norwich Flood, 1912."

17 F. }
18 S. } Examinations, Preston.

18 S. Demonstration—Meat Inspectors, at Metropolitan Cattle Market, at 12.30 p.m. Conducted by J. R. Hayhurst, M.R.C.V.S.

18 S. Inspection and Demonstration in the District of Chiswick, at 2.30 p.m. Conducted by J. H. Clarke, Chief Sanitary Inspector, Chiswick.

20 M. Demonstration to Sanitary Officers on Meteorological Instruments in the Parkes Museum, at 5.30 p.m., by the Director, E. White Wallis, F.S.S.

20 M. Lecture to Sanitary Officers, at 6 p.m. Elementary Science : Physics, Chemistry, by Alan E. Munby, M.A., F.R.I.B.A.

20 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Hygiene of the Home, by Miss N. T. F. de Chaumont, Sanitary Inspector, Kensington.

21 Tu. Lecture to Sanitary Officers, at 6 p.m. Elementary Science : Physics, Chemistry, by Alan E. Munby, M.A., F.R.I.B.A.

22 W. Inspection and Demonstration at Knight's Soap Works, Silvertown, E., at 2.30 p.m.

22 W. Lecture to Sanitary Officers and to Health Visitors and Child Welfare Workers, at 6 p.m. Elementary Statistics, by Joseph Priestley, M.D., D.P.H., M.O.H., Lambeth.

24 F. Lecture to Sanitary Officers, at 6 p.m. Infectious Diseases, by Joseph Priestley, M.D., D.P.H.

24 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Sociological Conditions, by Miss N. T. F. de Chaumont, Sanitary Inspector, Kensington.

24 F. Lecture to Meat Inspectors at Institute, at 6 p.m., by J. R. Hayhurst, M.R.C.V.S.

24 F. } **Sessional Meeting, Leeds,** in the Town Hall, at 7 p.m. Discussions on "The
25 S. } Limitations of Bacteriology in connection with Public Health Work," and "Hospital Management and Treatment of Infectious Diseases."

24 F. } Meat Examination, Manchester.
25 S. }

27 M. Lecture to Sanitary Officers, at 6 p.m. Methods of Disinfection, by Joseph Priestley, M.D., D.P.H.

27 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Home Visiting and Advice, by Miss Alice Moss, Sanitary Inspector and Health Visitor, Battersea.

MARCH.

1 W. Inspection and Demonstration in the District of Chiswick, at 2.30 p.m. Conducted by J. H. Clarke, Chief Sanitary Inspector, Chiswick.

1 W. Lecture to Sanitary Officers, at 6 p.m. Water: Composition, Pollution and Purification, by Joseph Priestley, M.D., D.P.H.

1 W. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Health Talks and Home Nursing, by Mrs. Lomax-Earp, Matron, Health Institute, Kilburn.

3 F. Lecture to Sanitary Officers and Health Visitors and Child Welfare Workers, at 6 p.m. Sanitary Appliances, by W. C. Tyndale, O.B.E., M.INST.C.E.

3 F. } Examinations, Norwich.
4 S. }

4 S. Demonstration—Meat Inspectors, Metropolitan Cattle Market, at 12.30 p.m.

4 S. Inspection and Demonstration at the Lambeth Disinfecting Station, at 2.30 p.m. Conducted by Joseph Priestley, M.D., D.P.H.

6 M. Lecture to Sanitary Officers and Health Visitors and Child Welfare Workers, at 6 p.m. House Drainage, by W. C. Tyndale, O.B.E., M.INST.C.E.

8. W. Lecture to Sanitary Officers, at 6 p.m. Details of Plumbers' Work, by Walter Scott.

8 W. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Water Supply: Fittings and Ventilation in the Home, by J. H. Clarke, Chief Sanitary Inspector, Chiswick.

10 F. Lecture to Sanitary Officers, at 6 p.m. Calculations, Measurements and Plans and Sections, by W. C. Tyndale, O.B.E., M.INST.C.E.

10 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Organisation and Management of Infant Welfare Centres and Clinics, by Mrs. Flora Shepherd, M.B., CH.B., Assistant M.O.H., Hornsey.

10 F. Lecture to Meat Inspectors, at 6 p.m., by J. R. Hayhurst, M.R.C.V.S., D.V.S.M.

11 S. Inspection and Demonstration at Express Dairy Co.'s Farm, Finchley, N., at 2.30 p.m.

11 S. Demonstration—Meat Inspectors, Metropolitan Cattle Market, Islington, N., at 12.30 p.m. Conducted by J. R. Hayhurst, M.R.C.V.S.

14 Tu. **Sessional Meeting, London,** at the Institute, at 5.30 p.m. Discussion on "Central Heating in relation to Domestic and other Dwellings."

14 Tu. Lecture to Sanitary Officers and to Health Visitors and Child Welfare Workers, at 6 p.m. Ventilation and Warming, by Edward Willis, Esq., A.M.INST.C.E., F.S.I., Engineer and Surveyor, Chiswick.

15 W. Inspection and Demonstration in the District of Islington, at 2.30. Conducted by James R. Leggatt, Superintendent, Public Health Department, Islington.

16 Th. Lecture to Sanitary Officers, at 6 p.m. Building Materials, by Edward Willis, A.M.INST.C.E., F.S.I.

16 Th. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Official and Voluntary Agencies administering to Child Welfare : The Children Act, by Mrs. Flora Shepherd, M.B., CH.B.

17 F. Lecture to Sanitary Officers, at 6 p.m. Building Sites, by Edward Willis, A.M.INST.C.E., F.S.I.

17 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Prevention of Communicable Disease, by R. Veitch Clark, M.A., M.D., M.O.H., Croydon.

17 F. } **Sessional Meeting, Blackburn,** in the Public Hall, at 6 p.m. Discussion on
17 S. } " Sanitation of Places of Entertainment " and " Conversion of Pail Closets."

18 F. }
18 S } Examinations, Portsmouth.

18 S. Demonstration—Meat Inspectors, Metropolitan Cattle Market, at 12.30 p.m.

18 S. Inspection and Demonstration at Schools and Public Buildings, Chiswick, at 2.30 p.m. Conducted by Edward Willis, A.M.INST.C.E., Engineer and Surveyor Chiswick.

18 S. Demonstration to Health Visitors and Child Welfare Workers, in the Parkes Museum, at 3 p.m. Conducted by J. H. Clarke.

20 M. Lecture to Sanitary Officers, at 6 p.m. Sewerage, by A. J. Martin, M.INST.C.E.

20 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Prevention of Communicable Disease, by R. Veitch Clark, M.A., M.D., B.SC., D.P.H.

22 W. Inspection and Demonstration in the District of Islington, at 2.30 p.m. Conducted by James R. Leggatt, Superintendent, Public Health Department.

22 W. Lecture to Sanitary Officers, at 6 p.m. Sewage Disposal, by A. J. Martin, M.INST.C.E.

22 W Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Tuberculosis, by R. Veitch Clark, M.A., M.A. B.SC., D.P.H.

24 F Lecture to Sanitary Officers, at 6 p.m. Water Supply, Sources of Supply and Distribution, by William Matthews, M.INST.C.E.

24 F Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Venereal Diseases, by J. Letitia Fairfield, C.B.E., M.D., D.P.H.

24 F Lecture to Meat Inspectors, at 6 p.m., by J. R. Hayhurst, M.R.C.V.S., D.V.S.M.

24 F }
25 S } Examinations, Edinburgh.

25 S. Demonstration—Meat Inspectors, Metropolitan Cattle Market, at 12.30 p.m.

25 S. Inspection and Demonstration at the Kingston-on-Thames Sewage Disposal Works, at 2.30 p.m. Conducted by A. J. Martin, M.INST.C.E.

25 S. Demonstration to Health Visitors and Child Welfare Workers, in the Parkes Museum, at 3 p.m.. Conducted by J. H. Clarke, Chief S.I., Chiswick.

27 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Ante-natal Hygiene (1), by Margaret G. Thackrah, B.A., M.D., M.R.C.P.

27 M. Demonstration in Fish Inspection for Meat Inspectors and Commissioned Officers, at the Institute, at 6 p.m., by Charles Hattersley, Chief Fish Inspector, Fishmongers' Company.

29 W. Inspection and Demonstration at Maypole Margarine Works, Southall, at 2.30 p.m.

29 W. Lecture to Sanitary Officers at 6 p.m. Scavenging, Disposal of House Refuse, by W. R. Hicks, A.M.INST.C.E., Borough Engineer and Surveyor, Ealing.

29 W. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Ante-Natal Hygiene (2), by Margaret G. Thackrah, B.A., M.D., M.R.C.P.

30 Th. Lecture to Sanitary Officers, at 6 p.m. The Laws, By-Laws, and Regulations affecting the Sale of Food, by J. Spencer Low, C.B.E., M.B., B.SC., D.P.H.

31 F. Lecture to Sanitary Officers, at 6 p.m. The Appearance and Character of Fresh Meat and other Foods, by J. Spencer Low, C.B.E., M.B., B.SC., D.P.H.

31 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Care of Mother and Infant (1), by Margaret G. Thackrah, B.A., M.D., M.R.C.P.

31 F.
1 S. } Examinations, Bristol.

APRIL.

1 S. Demonstration—Meat Inspectors, Metropolitan Cattle Market, at 12.30 p.m.

1 S. Inspection and Demonstration at Water Works, at 2.30 p.m. Conducted by W. Mathews, M.INST.C.E.

1 S. Demonstration to Health Visitors and Child Welfare Workers, in the Parkes Museum, at 3 p.m. Conducted by J. H. Clarke.

3 M. Lecture to SanitaryOfficers and Meat Inspectors, at 6 p.m. Signs of Health and Disease in Animals destined for Food, by J. R. Hayhurst, M.R.C.V.S.

3 M. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Care of Mother and Infant (2), by Margaret G. Thackrah, B.A., M.D., M.R.C.P.

5 W. Inspection and Demonstration at the Metropolitan Cattle Market, at 11 a.m. Conducted by J. R. Hayhurst, M.R.C.V.S., D.V.S.M.

5 W. Demonstration—Meat Inspectors, at Smithfield Market, at 11 a.m.

5 W. Lecture to Sanitary Officers and Meat Inspectors, at 6 p.m. The Names and Situations of the Organs of the Body in Animals, by Lieut.-Colonel T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M. (Lond.).

5 W. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Infant Feeding, by G. Eric Pritchard, M.A., M.D., M.R.C.P.

7 F. Lecture to Sanitary Officers and Meat Inspectors, at 6 p.m. Practical Methods of Stalling and Slaughtering Animals, by Lieut.-Colonel T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M. (Lond.).

7 F. Lecture to Health Visitors and Child Welfare Workers, at 6 p.m. Infant Feeding, by G. Eric Pritchard, M.A., M.D., M.R.C.P.

7 F.
8 S. } Examinations, Sheffield.

8 S. Demonstration—Meat Inspectors, at the Metropolitan Cattle Market, 12.30 p.m.

8 S. Inspection and Demonstration at the Sewage and Destructor Works, Ealing, at 2.15 p.m. Conducted by W. R. Hicks, A.M.INST.C.E., Borough Engineer and Surveyor, Ealing.

8 S. Demonstration to Health Visitors and Child Welfare Workers, in the Parkes Museum, at 3 p.m. Conducted by J. H. Clarke.

10 M. Lecture to Sanitary Officers and Meat Inspectors, at 6 p.m. Diseased Meat, with a Demonstration of Morbid Specimens collected from Meat Markets, by J. R. Hayhurst, M.R.C.V.S., D.V.S.M.

LIST OF MEMBERS AND ASSOCIATES

Elected November, 1921.

* Sanitary Science Certificate.
§ Sanitary Surveyors' (India) Certificate.
w Maternity and Child Welfare Workers' Certificate.
m Inspectors of Meat and other Foods Certificate.
‡ Inspector of Nuisances' Certificate.
v Women Health Visitors' and School Nurses' Certificate.
‖ Smoke Inspectors' Certificate.

MEMBERS.

Reg. No.		
4794	1921. Nov.	‡Barrett, Henry James, *21, Waldegrave Road, Ealing Common, W. 5.*
4795	1921 Nov.	Biswas, Haripada, *Sanitary Overseer, 191, L. Town, Jamshedpur, Singhbhum, India.*
4796	1921. Nov.	Cox, Joseph Peter, M.B.E., J.P., *Ty Gwyn, Knutsford, Ches.*
4797	1921. Nov.	*v*Creswell, Mrs. Mary Isabel, *c/o Capt. W. T. Creswell, c/o Messrs. Holt & Co., 3, Whitehall Place, S.W. 1.*
4798	1921. Nov.	‡*m*England, Frederick George, *Chief Sanitary Inspector, Health Department, Tuns Gate, Guildford.*
4799	1921. Nov.	Etherton, G. Hammond, *Town Clerk, Municipal Buildings, Liverpool, W. (Nominated by the City Council to represent the authority.)*
4800	1921. Nov.	Green, John Wilfrid, M.Inst.M.& C.E., *City Engineer and Surveyor, Town Hall, Durham.*
4801	1921. Nov.	Hellyer, Bertram Imrie, B.A.(Camb.), *35, Red Lion Square, W.C.1.*
4802	1921. Nov.	James, John Thomas, *County Surveyor's Office, Newland House, Lincoln.*
4813	1921. Nov.	*Needham, Frank Carlisle, *38, Bute Avenue, Lenton Sands, Nottingham.*
4803	1921. Nov.	Paget, George Frederick, M.Inst.M. & C.E., *Borough Engineer and Surveyor's Office, Town Hall, Basingstoke.*
4804	1921. Nov.	Rampton, Frederick, P.A.S.I., *91, Sandgate Road, Brighton.*
4805	1921. Nov.	‡Read, Walter Herbert, F.S.I., *The Avenue, West Ealing.*
4806	1921. Nov.	‡Robinson, Charles Edgar, *5, Cameron Road Seven Kings, Ilford, Essex.*
4807	1921. Nov.	Rowell, Robert Hindmarsh, *Sanitary and Heating Engineer, Byron Street Works, Newcastle-upon-Tyne.*
4808	1921. Nov.	Sanjana, Nadir Pestonji, B.Sc., B.E.(Bomb. Univ.), *Civil Engineer and Surveyor, Bhada Building, Grant Road, Bombay, India.*

4809 1921. Nov. SMITH, John Cameron, *102, Albany Street, Regent's Park, N.W.1.*

4810 1921. Nov. SPRINGALL, James S., *63, Rebsch Street, Byculla, Bombay, India.*

4814 1921. Nov. §VENKATRAM, S., *District Sanitary Inspector, Civil Dispensary, Bidar, Deccan, India.*

4811 1921. Nov. WELLS, Leslie Stuart Dean, *P.A.S.I., 96a, High Road, Leyton, E.15.*

4812 1921. Nov. WHITE, Edmund Leigh, M.D., CH.B., D.P.H. (*Assist. M.O.H.*), *113, Wilton Road, Shirley, Southampton.*

ASSOCIATES.

8673 1921. Nov. ‡GARNER, Sam, *19, King Edward Street, Macclesfield.*

8674 1921. Nov. ‡GRIFFITHS, Edgar Dennis, *2, Bertie Road, Wrexham.*

8682 1911. June ‡*m*HEATH, John Alexander, *2, Glebe Road, Gravesend, Kent.*

8675 1921. Nov. ‡*v*HENDERSON, Miss Lucy, *31, Burn Avenue, Forest Hall, Northumberland.*

8681 1921. Nov. ‡HOBDAY, Capt. Cecil Frank, F.A.I., *164, Upper Richmond Road, Putney, S.W.15.*

8676 1921. Nov. *v*MOORE, Miss Marjorie Kathleen, *Cavendish Lodge, Cavendish Road, Leeds.*

8677 1921. Nov. ‡O'SHEA, Timothy, *132, Harcourt Street, New Farm, Brisbane, Queensland.*

8678 1921. Nov. ‡PHILLIPSON, Roland Burton, *10, Lower Baggot Street, Dublin.*

8679 1921. Nov. ‡RODLEY, George, *40, Bestwood Park, Clay Cross, Derbys.*

8672 1921. Nov. SIMPSON, Walter Joseph, *12, Meldon Terrace, South Shields.*

8680 1921. Nov. ‡WILLIMOTT, Walter Thomas, *28, Esher Road, New Ferry, Ches.*

ELECTED DECEMBER, 1921.

MEMBERS.

Reg No.

4815 1921. Dec. ANDERSON, Lieut.-Col. John Allan, R.A.M.C., M.B., CH.B., D.P.H., D.T.M., *Royal Army Medical College, Grosvenor Road, S.W. 1.*

4816 1921. Dec. BULLER, Frederick Arthur, P.A.S.I., *63, Schubert Road, E. Putney, S.W.15.*

4817 1921. Dec. CHERRY, Albert Edwin, P.A.S.I., *97, Church Lane, Mill End, Rickmansworth.*

4828 1921. Dec. *‡ CRUICKSHANK, Oliver D., *135, Victoria Street, Rangiora, South Island, New Zealand.*

4818 1921. Dec. IVORY, George Harry, A.M.INST.C.E., *Public Works Department, Singapore, Straits Settlements.*

4819 1921. Dec. IYENGAR, Paravastur Gopala, B.A., M.E. (Madras Univ.), *Assistant Engineer, Sanitary Division, Bangalore, Mysore, India.*

4820 1921. Dec. JAGGAR, Wilfred, A.M.INST.C.E., *Borough Engineer, Huddersfield.*

4821 1921. Dec. ‡KILBURN, Richard Hugh, M.INST.M. & C.E., *Surveyor and Inspector, 2, Fountain Street, Gisborough, Yorks.*

4822 1921. Dec. MELHUISH, Lieut.-Col. Herbert Michael Henry, I.M.S., M.R.C.S., L.R.C.P., D.P.H., *c/o Messrs. T. Cook & Sons, Ludgate Circus, E.C. (Deputy Sanitary Commissioner, Sind, India).*

4823 1921. Dec. ‡*m*MITCHELL, Herbert, *Sanitary Department, Town Hall, Morley, near Leeds.*

4824 1921. Dec. MULHOLLAND, Henry Cunningham, M.B., B.CH. B.A.O., D.P.H. (*M.O.H. & S.M.O.*), *Council Offices, Swinton, Manchester.*

4829 1921. Dec. *PARRY, William Walter, *Tyn-y-Morga Farm, Gwespyr, near Chester, Flintshire.*

4825 1921. Dec. POWELL, Herbert William John, P.A.S.I., A.A.I., *155, Cathedral Road, Cardiff.*

4826 1921. Dec. SANER, James Donaldson, M.B., C.M., D.P.H., *Assistant Medical Officer of Health (Tuberculosis), 111, Marylebone Road, N.W. 1.*

4827 1921. Dec. SCHARFF, John William, B.A., M.B., B.CH., *Health Officer, Straits Settlements Medical Department, Singapore, S.S.*

4830 1921. Dec. *WASS, Arnold Crowther, *82, Willingham Street, Grimsby.*

ASSOCIATES.

8686 1921. Dec. ‡BATEMAN, John William, *78, Admiralty Street, Devonport.*

8687 1921. Dec. ‡BLACK, John, *12, Ann Street, Hebburn-on-Tyne.*

8683 1921. Dec. BODIE, Colin McLeod, *"Willowbank," 72, Glendoune Street, Girvan, Ayshire.*

8681 1921. Dec. CAVES, Miss Gertrude M. Dawson, *12, Priory Street, Cheltenham.*

8688 1921. Dec. ‡CLARK, Miss Elleanor, *253, Brighton Road, Gateshead-on-Tyne.*

8689 1921. Dec. ‡CROWDER, William Platt, *38, Lismore Road, Meersbrook, Sheffield.*

8702 1921. Dec. ‡CUTHBERTSON, William, *22, Learmouth Grove, Edinburgh.*

8690 1921. Dec. *v*DAVIES, Miss Gwen, *" Wakefield," Madoc Street, Llandudno.*

8691 1921. Dec. ‡GREEN, Miss Ruth, *37, Percy Park, Tynemouth.*

8692 1921. Dec. ‡HOLT, Arthur Howard, *8, Thomas Street, Bury, Lancs.*

8693 1921. Dec. *s*LENNARD, Miss Ellen Armstrong, *28, Princes Street, Bishop Auckland, Durham.*

8394 1921. Dec. ‡*m*‖LONGFELLOW, Alec, *Council Offices, Old Hill, Rowley Regis U.D.C., Staffs.*

8695 1921. Dec. ‡MORTON, Charles Leonard, *41, Albion Street, Brook's Bar, Manchester.*

8696 1921. Dec. ‡PAGE, William John, *4, Barrister Street, Beckett Street, Leeds.*

8697 1921. Dec. ‡PARKER, Herbert, *Thriplow, near Royston, Cambs.*

8685 1921. Dec. PARSONS, Mrs. Jessie E., *108, Mattison Road, Harringay, N. 4.*

8698 1921. Dec. *v*PILKINGTON, Miss Alice Beatrice, *" The Limes," Ormond Avenue, Richmond.*

8699 1921. Dec. ‡PURSALL, Clifford Henry, *18, Whittaker Road, East Ham, E. 6.*

8700 1921. Dec. ‡TAYLOR, George Sydney, *2, Beulah Terrace, Woodhouse, Leeds.*

8701 1921. Dec. *v*VENNER, Mrs. Roberta Elizabeth, *310, Hanworth Road, Hounslow.*

8703 1921. Dec. ‡WARLAND, Edmund George, *27, Isham Road, Norbury, S.W. 16.*

OBITUARY.

It is with deep regret that we have to announce the death of Professor Sheridan Delépine, at his home, Withington, near Manchester, on November 13th last.

Professor Delépine went to Manchester in 1891 as Proctor Professor of Pathology, succeeding the late Dr. Julius Dreschfeld in this appointment. He was one of the earliest of the whole-time scientific teachers of the Manchester Medical School, and notwithstanding the fact that he was not placed on the staff of the Royal Infirmary, an obvious necessity in the case of a teacher of pathology, he rapidly made his position appreciated, and his subject became one of the most successful in the medical course. He held the position for ten years, and then resigned in favour of the newly established Professorship in Public Health and Bacteriology.

Professor Delépine, with that far-sightedness which has characterised all his work, recognised the value to municipalities of properly equipped public health laboratories in which not only routine work could be performed, but where the highest and most complicated type of research could be satisfactorily conducted. The City of Manchester, through its distinguished Medical Officer of Health, Dr. Niven, gave the lead to the local authorities of Lancashire, Cheshire and neighbouring counties, with the result that Delépine was never without a subject of absorbing interest to engage the time of himself and his staff. Work in his laboratory was always performed with a thoroughness which was impressive, and those Medical Officers of Health who brought to his notice any special subject of enquiry profited materially by their contact with this great man.

He associated himself with the work of the Institute in various capacities—as president of a section at an annual conference ; as the opener of a discussion at a provincial meeting ; as the reader of a paper and a participator in debates. His co-operation was always welcomed, since he invariably was able to throw new light on most public health subjects.

It is not possible, in the brief space at our disposal, to enumerate the many works on which he was engaged, but his investigations into the self-purification of water, the causes of food poisoning outbreaks, the methods of obtaining a pure milk supply, and the various aspects of the tuberculosis problem stand out as amongst the most valuable.

Professor Delépine's personal qualities were such as endeared him to all who came into contact with him. He was admired and loved by all his students, and his life was spent in one long effort to improve the conditions under which humanity exists. W. J. H.

It is with regret that we have to report the death of the following Fellow, Members and Associates :—

Fellow :—Herbert Ernest Corbin, M.R.C.S., L.R.C.P., who was for some years Medical Officer of Health and School Medical Officer at Stockport. During the War he was a Major in the R.A.M.C.T. and acted as Medical Officer of Baghdad in 1917-18.

Members :—Surgeon-General The Hon. H. L. Clare, M.D., D.P.H., of Trinidad, who had been a member for 24 years. David Dryburgh Gold, M.D., D.P.H., who was the Medical Officer of Health, Chief School Medical Officer and Administrative Tuberculosis Officer for Herefordshire. Lachhmi Dhar Loomba, of Ambala, India. Charles Edward Wilkinson, of Kensington, for over 25 years a member of the Institute.

Associates :—John William Patterson, of Sydney, N.S.W. Percy Clarence Steventon, of Torquay.

DOMINION AND FOREIGN NOTES.

In November Dr. S. B. Mehta visited the Institute for the purpose of obtaining suggestions with regard to the formation of a Hygienic Museum in India.

In December we had the pleasure of welcoming to the Museum Dr. George Joannovich, Professor of Pathological Anatomy at the University of Belgrade ; and Dr. Radenko Stankovich, Professor of Internal Medicine, at the same University. These gentlemen came under the conduct of Dr. J. Alison Glover, of the Ministry of Health, and they were very interested in their visit.

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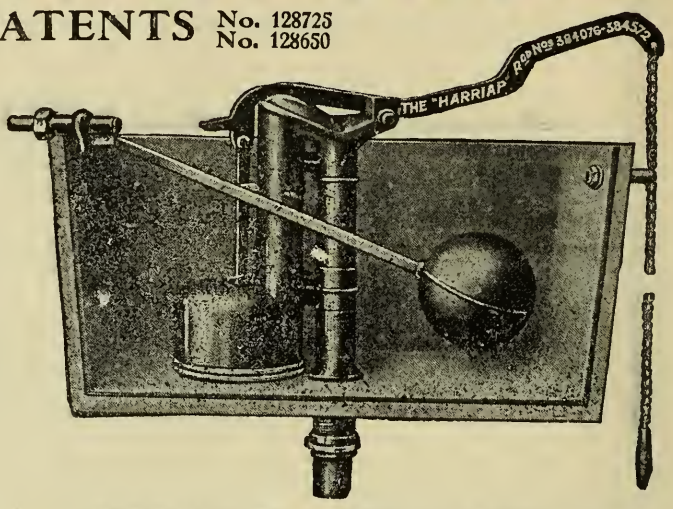

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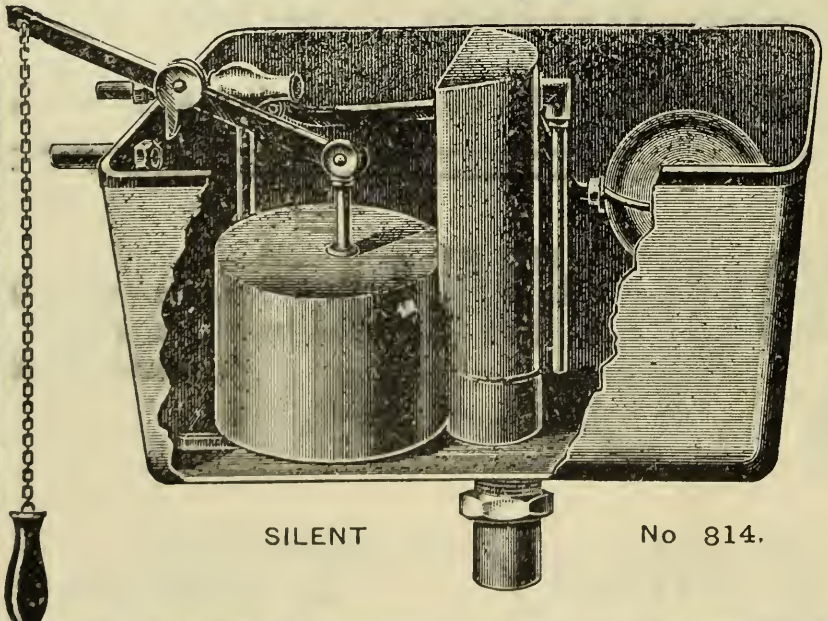

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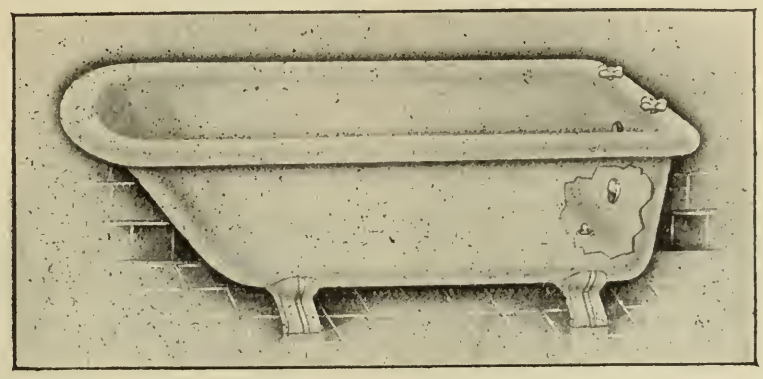

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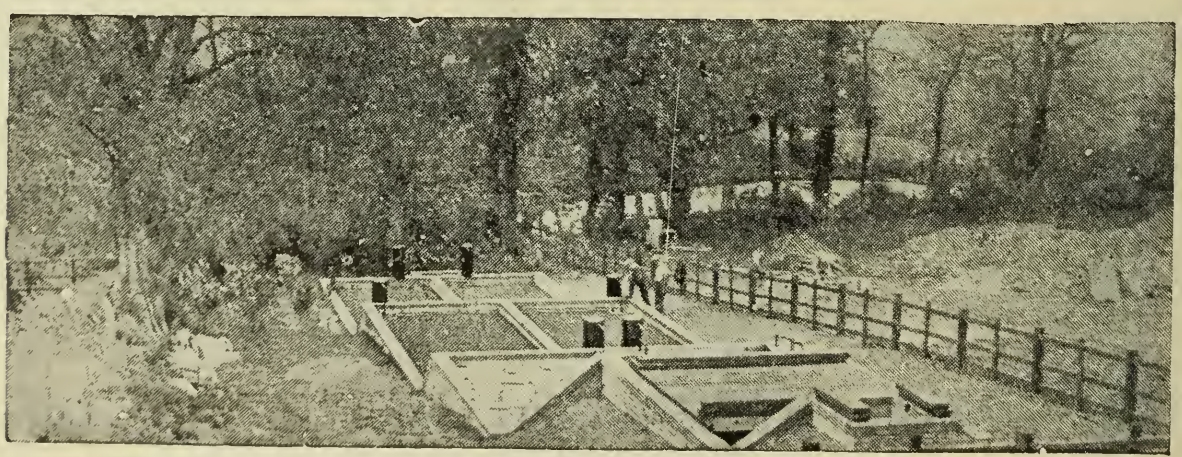

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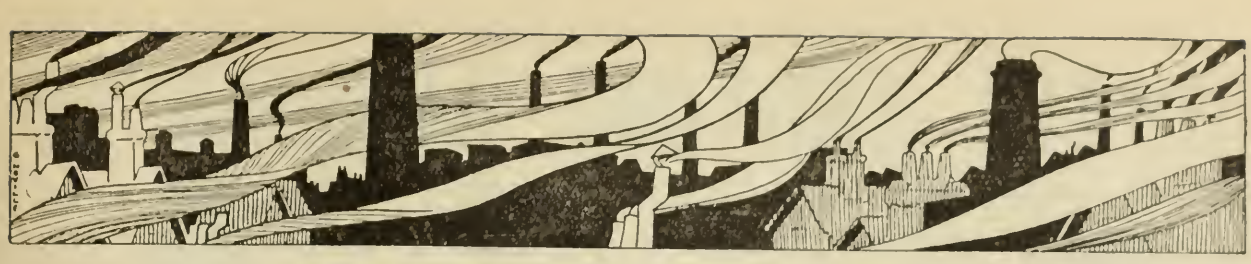

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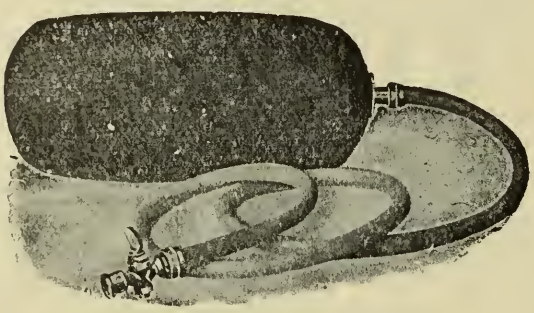

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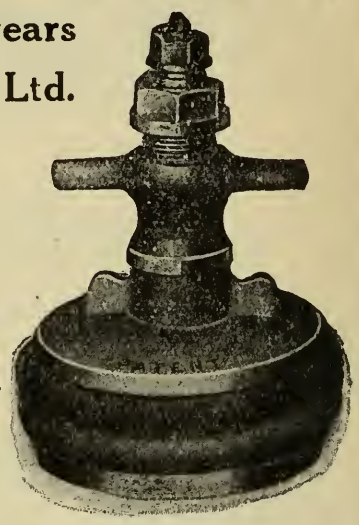

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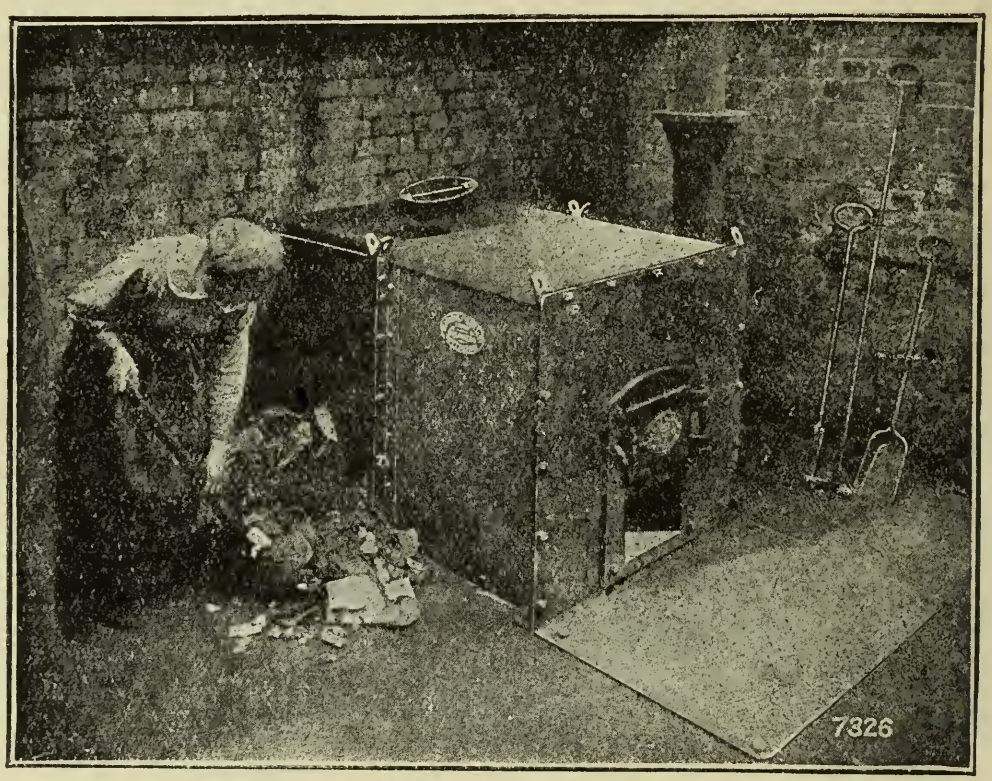

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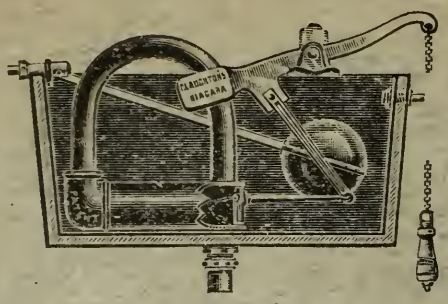

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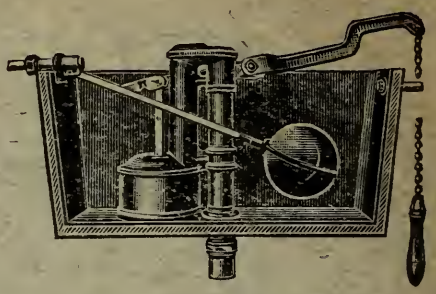

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